

# FUNDAMENTALS OF SAFETY EDUCATION

# Fundamentals of Safety Education

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# Preface

THIS BOOK has been written to serve as a textbook for a college course which aims at preparing students to assume responsibility for safety education and accident prevention programming in school, industry, or public service. Another purpose of the book is to provide a guide to assist teachers, supervisors and administrators in the development of various aspects of their safety education and accident prevention work.

The authors feel that safety education and accident prevention relates basically to one matter, *human behavior*, whether it is in the home, at school, on the job, in public places, or in a motor vehicle. There are certain concepts that are basic to safety education and certain fundamentals of developing effective safety programs that are common in all of these areas. A knowledge and understanding of the commonality of such concepts and fundamentals is essential if teachers, supervisors, administrators, safety engineers, enforcement officers, engineers, homemakers, and average citizens are each to make his greatest contribution to the common cause of the prevention of needless accidents that take such a large annual toll of our nation's human and economic resources. The 1961 Annual Report of the National Commission on Safety Education, National Education Association said:

During the relatively short history of the NEA's National Commission on Safety Education, safety education has progressed from unsophisticated presentations of accident statistics and the memorizing of safety rules to comprehensive programs of instruction and protection affecting all grade levels and most curriculum areas. Indeed, safety education has come of age on the American education scene.

The purpose of this book is to provide an understanding of the elements of comprehensive programs of instruction and protection that is consistent with the maturity the safety education movement has attained.

The content of this book has evolved over a period of years and is based upon the many years of experience of the authors in education, accident prevention and safety education. The book is organized for a logical sequence of instruction. The first part deals with the nature, history, implications, and fundamental principles of safety education and accident prevention. Parts Two and Three offer practical applications of accident prevention programming to schools, home, industry and public places. The closing part relates to the implications for safety education in the future.

The content of the book emphasizes the safety applications of many broad areas such as philosophy, psychology, research, and curriculum. For a more comprehensive understanding of these areas the student should refer to the abundant literature published in each of these disciplines.

It is hoped that this book will serve as a useful basic reference source for all persons interested in the conservation of human resources through safety education, and particularly for those persons who are professionally engaged in occupations where safety education and accident prevention constitute a part or all of their responsibilities.

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# Part One-THE ACCIDENT PREVENTION MOVEMENT

This section comprises the first five of the twenty chapters of the book. Chapters one through four discuss the nature and scope of the accident problem, explore the origin and development of the accident prevention movement, the philosophy of safety, and the psychological implications involved in safe human behavior. This introduction is followed by an identification of fundamental principles and techniques of accident prevention programming which have universal application in the field of safety education. The next twelve chapters of the book are devoted to the application of these principles and techniques to the various areas of human endeavor.

Included in Part I are the following:

1. Accidents Are a Major Social Problem
2. Evolution of the Accident Prevention Movement
3. A Philosophy of Safe Human Behavior
4. Psychological Factors Related to Safe Human Behavior
5. Principles and Techniques of Accident Prevention Programming.

# Accidents Are a Major Social Problem

THE LOSS of human and economic resources and the personal tragedies involved in accidents have become a major social problem in the nation. The mounting toll of deaths, personal injuries, and property damage resulting from the increasing number of accidents accompanying the high degree of mechanization achieved during the 20th century has become one of the most important, unsolved problems in the history of the United States. Accurate statistics on all phases of accidents are not available, particularly prior to 1930. However, from existing data, a most conservative estimate would place the accident toll for the first 60 years of the century as at least 5,250,000 deaths, 500 million injuries, and an economic loss of well over 100 billion dollars.<sup>1</sup> About 20 per cent of all injuries resulted in permanent disabilities. *That a nation so conscious of the dignity and personal rights of the individual should continue to tolerate such a needless waste of human lives and suffering of its people is unthinkable. That a nation which has developed such a great economic strength should continue such operational inefficiencies is unbelievable. A greater effort unquestionably must be made to reduce needless accidents in the future.*

Substantial progress has been made in the field of accident prevention. A rate of 50 deaths per 100,000 persons in the total population in 1961 was the lowest recorded to that date. But, as yet, the total accident problem in America has not been faced realistically. Its existence has been acknowledged through President's conferences on highway safety, industrial

<sup>1</sup> National Safety Council, *Accident Facts* (Chicago: The Council, 1961), pp. 1-96.

safety, child health and safety, and employment of the physically handicapped. These important matters have been discussed further in similar conferences conducted at state and local levels. Through these conferences many aspects of the problem have been isolated and many of the conditions that must be realized to prevent accidents have been defined. However, a large number of known measures of control still have not been projected into effective operation.

### WHAT IS AN ACCIDENT?

In order to understand the implications of the vast array of accident statistics, and to make optimum use of these statistics in accident prevention work, the development of a common understanding of the term *accident* becomes essential. An *accident* may be thought of as *an unplanned act or event resulting in injury or death to persons or damage to property*. The key to this definition is the word, *unplanned*. This suggests an absence of acts or events resulting in injury, death, or property damage in the planned environment as contrasted with the presence of such acts or events in the unplanned environment. This point has been established in fact. The accident frequency and severity rates are lower in orderly industrial plants with well-guarded equipment, maintained in safe condition and operated by properly selected, well-trained employees. There are fewer injuries on properly equipped athletic teams that have been adequately conditioned and trained. There are fewer accidents in school events where careful planning and proper supervision are exercised. The fatality rate is lower on well-designed, limited access freeways than on highways that are less scientifically engineered. Proper planning is essential to any effective accident prevention program.

### THE ACCIDENT PROBLEM IN OUR SOCIETY

The tremendous annual loss of human and economic resources due to accidents has become one of the most important social problems to plague the nation. Any condition that inflicts more deaths, personal injuries, and destruction upon a nation than all the wars in its history must be accepted as a prime social problem. In the time that it will take the average person to read this chapter, there will be three persons killed and about 350 more injured in accidents that could have been prevented. As a result of these accidents, the nation will suffer an economic loss of about \$400,000.

Official reports of the World Health Organization of the United Nations show the accidental death rates of 42 nations during the years 1956-58 ranging from a low of 14.4 to a high of 69.9. The United States ranked 35th with a death rate of 52.3 per 100,000 population in 1958. Although this may be explained in part by the fact that this nation has a complex, highly mechanized economy, the rate is still much higher than it should be. The death rate in the United States has been gradually reduced to the low figure of 50 in 1961 from the 85.5 rate in 1913, the year of the formal organization of the national safety movement. This means that nearly one million lives have been saved in less than 50 years, largely because of improved safety measures. This fact represents a constant challenge to people in the accident prevention field to work toward a continual reduction of the accident rate until it reaches an absolutely irreducible figure. Only then will the people be free of the ever-present threat to their lives and well-being posed by careless acts of their fellow citizens and unsafe conditions in their environment. In order to develop a realistic understanding of the nature and scope of the accident problem which confronts the nation, it becomes necessary to make a careful analysis of both the social and economic implications that it projects.

#### SOCIAL IMPLICATIONS

It is impossible to measure with any degree of accuracy the total social impact of accidents on the nation as a whole. The numbers of accidents are so large that they have become almost meaningless in terms of the suffering they inflict. It is the primary purpose of safety work to alleviate this condition by a reduction of accidental death and injury.

Figure 1:1 shows annual injury statistics as reported by the U.S. Public Health Service in a National Health Survey and the annual report of the National Safety Council\* in a recent year. The wide variation in these reports is due to the difference in degree of severity of injuries counted, differences in definitions, and the inclusion of nonaccidental injuries in the National Health Survey. National Safety Council statistics include only disabling injuries. A *disabling injury* is one which caused the

\* The National Safety Council is a nonprofit organization dedicated to accident prevention. Founded in 1913 and chartered by Congress in 1953, the Council has provided outstanding leadership in the safety movement and is a foremost authority in the field of accident statistics. All accident facts in this chapter are based on the annual publication of the Council, *Accident Facts*. Statistics used in the chapter were for 1960, a typical year. Figure 1:3 shows the number of fatalities in the principal classes of accidental deaths for a 20-year period.

person to restrict his usual activities beyond the day of the accident. The National Health Survey includes also all medically attended injuries, whether or not the person was disabled beyond the day of the accident.

Annual Injury Statistics		
Class of Accidents	U. S. Public Health Service Estimated Annual Average July 1957-June 1960	National Safety Council 1960
Work	8,250,000	1,950,000
Motor Vehicle	4,388,000	1,400,000
Home	19,068,000	4,100,000
Public	13,481,000	2,050,000
Total	45,187,000	9,400,000*

\*The difference in total is due to reporting of an injury in more than one class.

FIGURE 1:1. Annual injury statistics.

The injury estimates of both groups are believed to be reasonably accurate in terms of their respective definitions. It is readily apparent that, while the largest number of accidental deaths occur in motor vehicles, the home is a far more hazardous place than a motor vehicle, in terms of accidental injuries.

The many social implications of accidents are in addition to the grief attendant to the loss of loved ones. The death of a doctor, scientist, or public official removes from society a needed talent difficult to replace. When the head of a family is the victim, it means a serious readjustment of the lives of all persons involved. In many cases, it will cause the denial of proper education for a promising student. The loss of the mother results in children growing up without her necessary guidance. All of these conditions can lead directly to juvenile delinquency, another major concern of society. In cases of permanently disabling injuries, it often means a disturbing change in family standards of living, resulting from the costs of care and the loss of normal income. Many accidental injuries result in permanent physical handicaps causing serious problems of readjustment, retraining, and job placement.

There are thousands of fatalities annually involving preschool and school-aged children. With the normal life expectancy for men now approaching 70 years, and women now exceeding that figure, the accidental death of a child means the loss of well over 50 years of productive life.

An important social implication of accidents is revealed when a comparison is made between accidents and disease as causes of death. Accidents are the leading cause of death among persons under 36 years of age. Figure 1:2 shows the leading causes of death at all ages.

Cause	Number of Deaths			Death Rates*		
	Total	Male	Female	Total	Male	Female
All Causes	1,656,814	943,088	713,726	939	1,084	797
Heart disease†	641,044	375,906	265,138	363	432	296
Cancer	260,047	139,078	120,969	147	160	135
Vascular lesion‡	191,376	91,021	100,355	108	105	112
Accidents	92,080	63,639	28,441	52	73	32
Motor-vehicle	37,910	28,064	9,846	21	32	11
Pneumonia	55,955	31,995	23,960	32	37	27
General arteriosclerosis	34,622	16,460	18,162	20	19	20
Diabetes mellitus	28,080	11,232	16,848	16	13	19

\*Deaths per 100,000 population

†Includes rheumatic fever

‡Affecting central nervous system

FIGURE 1:2. Leading Causes of Death Among Persons of All Ages.

#### ECONOMIC IMPLICATIONS

With the rise in costs of other commodities in the nation, there also has been a sharp rise in the economic costs of accidents. The National Safety Council estimates the cost of accidents yearly in its annual statistical study, *Accident Facts*. To determine these costs they include such items as wage losses, medical and hospital fees, administrative and claims costs, property damage in motor vehicle accidents, property destroyed by fire, and production lost due to work accidents. The figure does not include loss of earning power or liability payments. In a recent year, these costs totaled in excess of 14 billion dollars, or about equal to the amount spent on public education. This vast amount represents an economic loss to the nation that can be a serious matter both to the national economy and to national safety. This is particularly true in times of a threat to national security or of economic distress.

## UNDERSTANDING THE ACCIDENT PROBLEM

It has been stated that all accident prevention work must begin with the facts. This means that before an accident prevention program can be developed there must be a clear understanding of the nature and scope of the accident problem. Such factual data can be obtained only through an analysis of accident records and reports to determine such things as the number of accidents, the extent of injuries and damage, the location of accidents, the types of accidents, and other pertinent information. Accident statistics become the foundation upon which any effective safety program will be developed in schools, industry, homes, or public places. With these facts at hand the student of accident prevention and safety education must learn to interpret them in terms of basic needs of an accident prevention program to meet the conditions of any given situation.

## USING ACCIDENT DATA

Although it is true that sound accident prevention programs must be founded on fact, the safety worker must exercise considerable discretion in the application of accident data. Many accident statistics are invalid because of inadequate sampling, inaccurate data, improper research techniques, or erroneously drawn conclusions. Sometimes the facts are skewed to prove the point of the researcher rather than to obtain objective data. These factors often are found in studies comparing men and women drivers. Many such studies are invalid because they neglect to compare the true nature of the exposure to hazards of the two groups.

Accident data are available in several usable forms. The number of fatal, injury, and property damage accidents and their costs provide general information concerning the dimension of the problem. Information relating to the conditions of the accident is helpful in developing accident prevention measures. Evaluation statistics can be used to measure the effectiveness of preventative programs. However, they must be used with caution, for they may lack validity. There are also research data which give valuable information relating to basic causes of accidents. Unfortunately, there are not enough such data at this time even though much more attention has been given to them in recent years. Persons in

the safety field should be familiar with the presence and limitations of all available factual data so that they may make optimum use of them in the development of a comprehensive accident prevention program.

### TRENDS IN ACCIDENT DEATH RATE

An important question to be raised by the person beginning the study of accident prevention work is, "What progress is being made?" Are accidents increasing or are they being brought under control? What factors influence accident trends?

The most accurate data to measure progress in this area are found in the accidental death rate. Because the population of the nation has increased so rapidly since 1900, and the nature of society has become so highly mechanized and complex, comparisons must be made in terms of death rates rather than in numbers of deaths alone. The number of deaths has remained almost unchanged in some cases, but the rate of deaths per 100,000 persons has shown a noticeable decline. It is a note of encouragement to persons interested in safety work that this decline is due in a very large measure to the effectiveness of accident prevention programs which apply the techniques of accident control that have been developed over the past 20 years. Figure 1:3 shows this favorable trend. Although the table reflects a marked reduction in the number of deaths per 100,000 population in each of the classes, this is least evident in the motor vehicle class. This is due to the great increase in vehicle miles traveled annually. However, during this period the death rate per 100 million miles of travel was reduced by more than half.

### WHO IS INVOLVED IN ACCIDENTS

Almost anybody can have an accident. No special time, place, or equipment is necessary. Accidents are no respecter of race, creed, social status, age, or sex. The aged and the young, the rich and the poor, men and women all have accidents. To understand the nature of the accident problem it is imperative to know something of accident occurrence by age, sex, and the type of activity in which the injured persons are involved.

**ACCIDENTS BY AGE GROUPS.** There is a positive correlation between different types of accidental deaths and injuries and the various age groups. This is due largely to the varying degrees of exposure to conditions

Year	TOTAL*		Motor-Vehicle		Public Non-Motor-Vehicle		Home		Work	
	Deaths	Rate†	Deaths	Rate†	Deaths	Rate†	Deaths	Rate†	Deaths	Rate†
1941	101,513	76.3	39,969	30.0	16,500	12.4	30,000	22.5	18,000	13.5
1942	95,889	71.6	28,309	21.1	16,000	12.0	30,500	22.8	18,500	13.8
1943	99,038	73.8	23,823	17.8	17,000	12.7	33,500	25.0	17,500	13.0
1944	95,237	71.7	24,282	18.3	16,000	12.0	32,500	24.5	16,000	12.0
1945	95,918	72.4	28,076	21.2	16,000	12.1	33,500	25.3	16,500	12.5
1946	98,033	70.0	33,411	23.9	17,500	12.5	33,000	23.6	16,500	11.8
1947	99,579	69.4	32,697	22.8	18,000	12.6	34,500	24.1	17,000	11.9
1948 (5th Rev.)	98,001	67.1	32,259	22.1	17,000	11.6	35,000	24.0	16,000	11.0
1948 (6th Rev.)‡	93,000	63.7	32,259	22.1	16,000	11.0	31,000	21.2	16,000	11.0
1949	90,106	60.6	31,701	21.3	15,000	10.1	31,000	20.9	15,000	10.1
1950	91,249	60.3	34,763	23.0	15,000	9.9	29,000	19.2	15,500	10.3
1951	95,871	62.5	36,996	24.1	16,000	10.4	30,000	19.6	16,000	10.4
1952	96,172	61.7	37,794	24.3	16,000	10.3	30,500	19.6	15,000	9.8
1953	95,032	60.0	37,955	24.0	16,500	10.4	29,000	18.3	15,000	9.5
1954	90,032	55.9	35,586	22.1	15,500	9.6	28,000	17.4	14,000	8.7
1955	93,443	58.9	38,426	23.4	15,500	9.4	28,500	17.3	14,200	8.7
1956	94,780	56.7	39,628	23.7	16,000	9.6	28,000	16.7	14,300	8.5
1957	95,307	56.0	38,702	22.7	17,500	10.3	28,000	16.4	14,200	8.3
1958	90,604	52.3	36,981	21.3	16,500	9.5	26,500	15.3	13,300	7.7
1959§	92,080	52.2	37,910	21.5	18,500	9.3	27,000	15.3	13,800	7.8
1960¶	93,000	51.7	38,200	21.2	16,500	9.2	27,500	15.3	13,800	7.7

Source: Total deaths and motor-vehicle deaths from 1903 to 1932 calculated from National Office of Vital Statistics data for death registration states; from 1933 to 1948 (5th Rev.), 1949 to 1959, they are NOVS totals for the United States. All other figures are National Safety Council estimates based on data from NOVS, state and city health departments and other sources.

(Courtesy National Safety Council)

\* Duplications between Motor-Vehicle, Work and Home are eliminated in the TOTAL column.

† Rates are deaths per 100,000 population.

‡ In 1948, a revision was made in the official method of classification, the International List of Causes of Death. In the table, the first figures for 1948 are comparable with those for earlier years; the second figures are comparable with those for later years.

§ Includes Alaska; excludes Hawaii.

¶ Includes Alaska and Hawaii.

FIGURE 1:3. Principal Classes of Accidental Deaths in the United States—1941 to 1960.

experienced by these age groups as a direct result of their activities. Active youngsters of preschool and early school years are involved in accidents while playing in the streets. Elderly persons, whose physical agility decreases with age, are particularly subject to injuries resulting from falls. Figure 1:4 shows the distribution of deaths by age groups of the 93,000 accidental deaths in 1960.

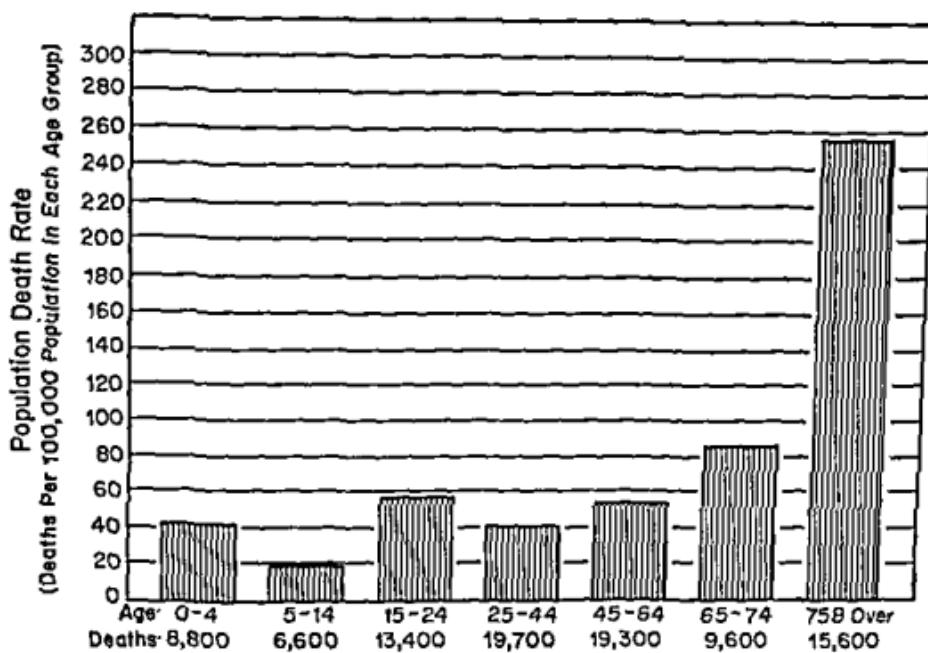


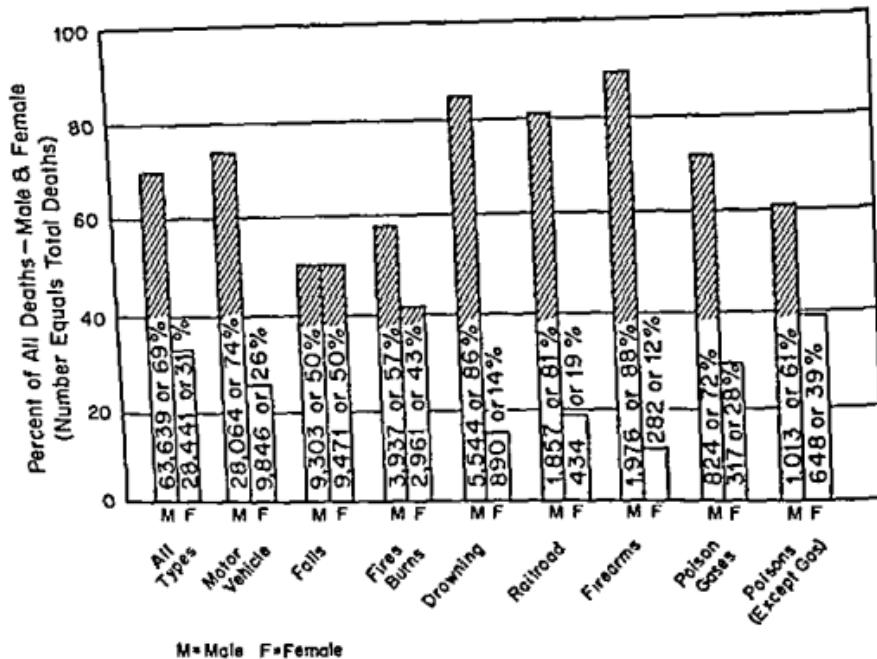
FIGURE 1:4. Accidental deaths by age groups—1960.

(Courtesy National Safety Council)

The relationship between the age of fatally injured persons and accident involvement in various types of hazardous activities is revealed by statistics. There were 18,200 deaths from falls in 1960, with 13,300 occurring to persons 65 years of age and over. On the basis of the population death rate, death by poisons occurred in the newborn to four-year age group three times as often as in any other age group. In children aged 1 to 14 years, accidents claim more lives than do the four leading diseases combined. For young people aged 15 to 24 years, accidents claim more lives than all other causes combined.

**ACCIDENTAL DEATHS OF MALES AND FEMALES.** Men and boys are involved in more than two thirds of the accidental deaths, while women and girls are involved in fewer than one third. Five out of six accident victims aged 15-24 years are males. The reasons for this are not entirely clear. Perhaps men participate to a greater extent than women in hazardous activities; or perhaps men more often engage in rigorous, adventuresome action. Men may exercise a lesser degree of caution than women. Whatever the reasons, these facts must be considered in the development of effective accident prevention work. In accidental deaths of all types during a recent year, there were 63,639 male and 28,441 female fatalities.

Sixty-nine per cent of accidental deaths were males. The only category in which female deaths exceed male deaths is in falls. Since more than half of such deaths occur at age 75 or over, the greater longevity of women is probably a significant factor. Figure 1:5 shows the distribution of accidental deaths among males and females in various types of activities.



M = Male F = Female

FIGURE 1:5. Accidental deaths—male and female.

#### TYPES OF ACCIDENTS

The types of accidents in which people are involved is determined in a large measure by the degree of exposure to hazardous conditions found in the activities in which they engage. Figure 1:6 shows the types of accidental deaths recorded in 1960. It will be noted that the total is somewhat in excess of 93,000. This is due to some duplication in classification of accidents by type, and the fact that figures are rounded to approximate totals rather than given as exact numbers. This points up one of the practical limitations that must be recognized in the use of all accident statistics. The classification, "all other types," includes machinery, suffocation, air transport, blows by falling objects, excessive heat, and other types of serious but less frequently occurring accidental deaths.

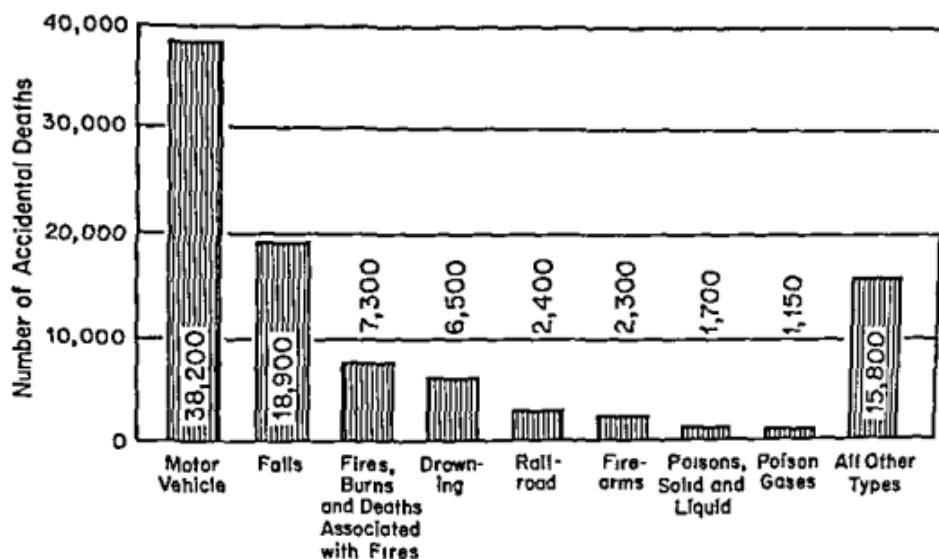


FIGURE 1:6. How people died accidentally in 1960.

### CLASSIFICATION OF ACCIDENTS

Accidental death and injury are elements of a wide variety of activities in which people participate. However, for useful information in accident prevention programming it is necessary to group statistical data in general categories. These categories, in which accident statistics are reported by the National Safety Council, include work, motor vehicle, home, and public. Public accidents exclude motor vehicle and work accidents in public places. They include recreation (swimming, hunting, and the like), transportation except motor vehicle, public building accidents, and so forth. Figure 1:7 shows the distribution of accidents in these classes during 1960. During that year there were 93,000 deaths and 9,400,000 disabling injuries. These figures are best possible estimates and cannot be compared accurately from year to year. This is due largely to the absence of accurate reporting methods for disabling injuries in some of the classes of accidents. The total deaths and injuries in these classes exceed the total reported for the year because of some duplication reported within the various classes.

**MOTOR VEHICLE ACCIDENTS.** The number of drivers, the number of registered motor vehicles, and the number of miles driven continue to rise each year. There are now over 90 million licensed drivers operating over 75 million motor vehicles in the United States. They drive in excess of 725 billion miles annually. There are over 10 million motor vehicle

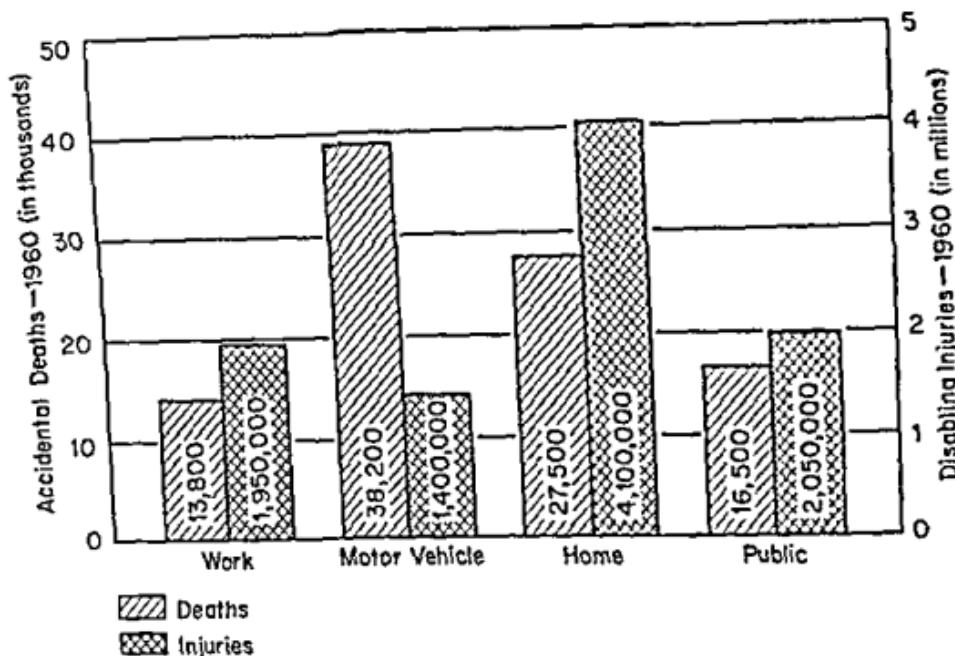


FIGURE 1:7. Accidental deaths and disabling injuries.

accidents each year. Of these, 33,000 involve at least one fatality, 900,000 involve at least one nonfatal injury, and over 9.5 million involve reportable property damage. It should be understood that requirements for reporting property damage accidents differ from state to state. Motor vehicle accidents continue to claim more lives each year than any other type of accident. The relationship of motor vehicle deaths and injuries to the total accident problem is shown in Figure 1:8.

The total economic loss to the nation annually from motor vehicle accidents is computed to be about seven million dollars. Because of rising repair and replacement costs for damaged vehicles, medical expense, and insurance costs, this figure increases yearly.

Violations of traffic laws, failure to make driving a full-time responsibility, lack of common courtesy, and driving after consuming alcoholic beverages are all prominent factors in traffic accidents. Driving too fast for conditions and failure to yield right-of-way are among the most frequently *reported* causes of traffic accidents. In 1960, about 10,000 of the 32,000 fatal motor vehicle accidents involved drinking drivers. About 1,000 of the 5,700 adult pedestrians killed had been drinking. Of concern to traffic officials is the increase of noncollision, single-car fatal accidents.

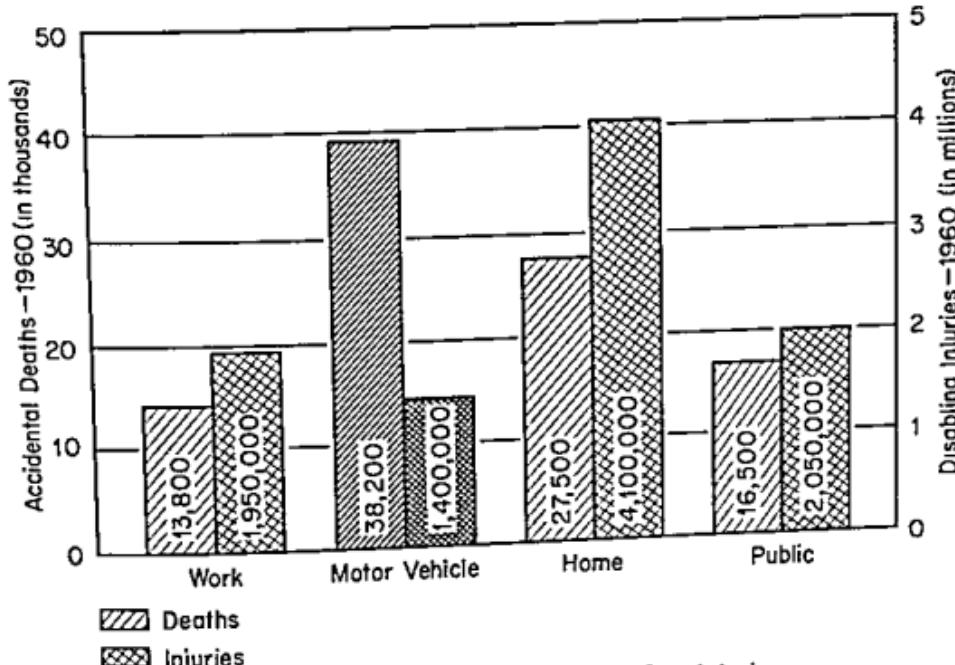


FIGURE 1:8. Accidental deaths and disabling injuries.

This category now includes more than 40 per cent of the mounting rural traffic fatalities. Human failures such as speed, drinking, lack of courtesy are the cause of more than 90 per cent of the motor vehicle accidents.

Since the advent of the automobile in America in about 1890, there have been nearly 1.5 million deaths on the streets and highways of the country. During the past 10 years the annual traffic toll has remained very close to the 10-year average of approximately 38,000 deaths per year. However, the fact that this figure has remained relatively constant in the face of greatly increasing highway travel is small consolation. During 1941 traffic fatalities reached the all-time high of 39,969, with a death rate of 12.0 per 100 million miles of travel. This rate has been reduced gradually over the years to a new low mileage death rate of 5.2 recorded in 1961. Traffic deaths exceeded 40,000 per year for the first time in 1962 when there were approximately 41,000 fatalities.

The reduction of the mileage death rate must be credited in a large measure to the increased interest of the driving public in making highway travel safer. Public agencies and business interests have promoted and financed programs designed to reduce traffic accidents. Improved driver licensing requirements, better highway design and construction, improved design and more safety devices such as seat belts in automobiles, better

medical attention for the injured, periodic safety inspections of vehicles, and more rigorous enforcement by both the police and the courts all have been important factors in this reduction. Probably one of the most significant factors in the reduction of the mileage death rate has been the improved education of drivers. Each year, more than a million new drivers receive driver education in the classrooms of secondary schools throughout the nation. Many thousands of persons, mostly adults, are taught safe driving practices each year through the growing commercial driving school industry. But, if the challenge of the next few years is to be met successfully, these efforts must be greatly accelerated. By 1975, it is estimated that there will be more than 100 million licensed drivers operating over 100 million automobiles over one trillion miles a year on the crowded streets and highways of the nation.

**HOME ACCIDENTS.** The home, traditionally considered a haven of security against the forces of the outside world, is the setting for more accidents than any other place in society. Based on recent U.S. Public Health Service surveys, it is estimated that a staggering total of 19,960,000 injuries occur in the nation's homes each year. Of these, nearly 60 per cent are activity-restricting to some degree. More than 20 per cent of them are actually bed-disabling.

The number of home accident deaths and injuries as reported by the National Safety Council is shown in Figure 1:9. The two primary types of accidental death in the home are falls and deaths associated with fire. Other prominent types of home accident deaths include suffocation, poisons, firearms, and poison gases. It is of importance, also, to recognize that the hazards of the home take their greatest toll in the age groups of the elderly and the very young. These facts provide a sound guide for safety education. Home accidents are largely a problem of non-school-aged persons. Programs of accident prevention in the home must make use of all available means of education and information. Some of the proven sources of home safety education include:

1. Newspapers, magazines, television and radio.
2. Home safety checklists.
3. Civic, service, fraternal and religious organizations.
4. Parent-teacher groups.
5. Safety councils.
6. Insurance groups.

However, one of the best long-range means of promoting home safety is through education of school-aged students in the importance of the principles of safe living. This practice will result in improved conditions

## Accidents Are a Major Social Problem

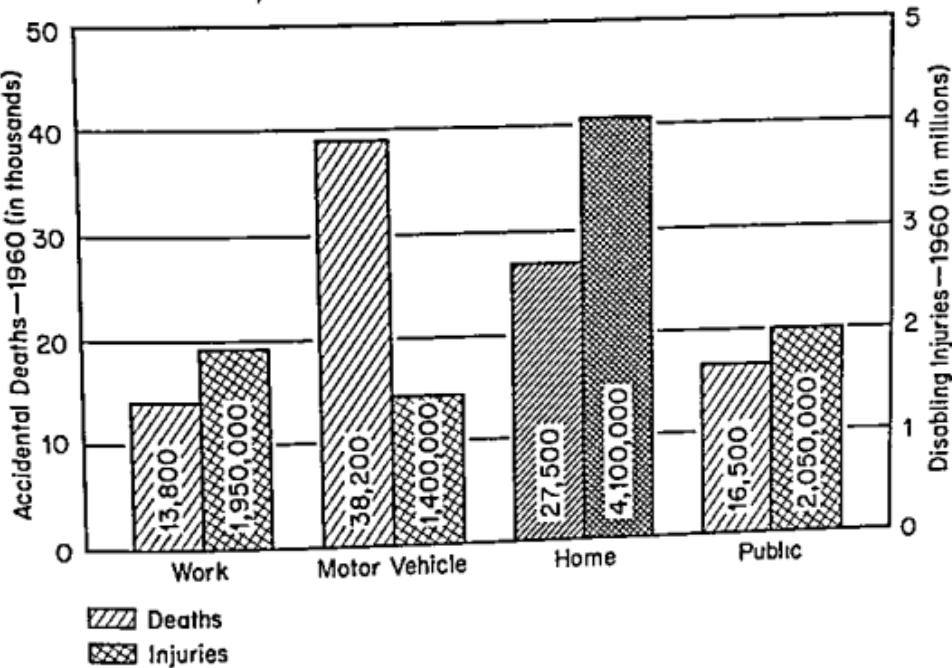


FIGURE 1:9. Accidental deaths and disabling injuries.

of home safety when these young people become heads of their own family units.

ON-THE-JOB ACCIDENTS. The greatest progress in accident reduction has been in the industrial community. This is due to a number of factors, including the many years that industry has concentrated on the accident problem, the direct relationship between accidents and production costs, and the direct employee supervision possible in the industrial situation. State and Federal laws regulating conditions of safety under which the employee may work have also contributed to this record. But the most important factor in this progress has been the organized safety programs developed by industry, largely because of economic factors and regulatory laws. Industrial plants with safety programs have much better accident records than those without such programs.

Industry is interested in accidents in terms of both numbers and severity. Therefore, it maintains records of both severity and frequency rates. This provides valuable information for accident prevention work. Industries frequently refer to this as *loss prevention*, because they are interested in reducing the economic costs of accidents in their production processes. Both severity and frequency rates have been reduced by more than half in the last 30 years.

The industrial safety movement was greatly stimulated during World

War II. At a time when rapid production was such an important factor to the welfare of the nation, the severe loss of production due to accidents was brought into sharp focus. The result was intensified effort in accident prevention. Special recognition was given to plants that maintained outstanding safety records during the completion of defense contracts. The principles of accident prevention that made these records possible have been continued and refined so that postwar industrial safety records have continued to improve. It has been demonstrated that accidents can be controlled when an operation such as the huge chemical plant of the E. I. Du Pont de Nemours & Company at Chattanooga, Tennessee, can complete over 31.5 million man-hours worked without a disabling injury.

Unsafe acts by workers and defective agencies involved in the performance of the job are basic causes of industrial accidents. The primary sources of industrial injury are falls and the handling of objects. Machinery, tools, harmful substances, and vehicles are additional injury sources. However, there is a greater interruption of industrial production because of employee accidents away from work than those actually incurred in the performance of the job.

Because of workmen's compensation laws that exist in various states, there are quite accurate records on the costs of industrial injuries. Actual costs, not including liability, approximate \$775 each in all work injury cases, with fatalities averaging nearly \$14,000 and permanent partial disabilities over \$1,200. Figure 1:10 shows the relative significance of industrial deaths and injuries.

**PUBLIC ACCIDENTS.** Public accidents are divided into two categories, transportation and nontransportation. The gathering of data in these areas is difficult and sometimes confusing. For example, falls and drownings involving transportation are listed only as transportation fatalities and are not shown under the classification of falls or drownings in nontransportation accidents.

A recent 10-year average of deaths in public accidents reveals an average of about 16,000 fatalities per year. In addition, about 2 million injuries occur annually. Figure 1:11 shows public fatalities and injuries in 1960. Drownings and falls are the most frequent causes of nontransportation deaths, and air and water are the most frequent settings for deaths in the transportation field. Due to improved safety practices and the use of other types of passenger transportation, the number of railroad deaths has decreased noticeably in recent years. Drowning deaths are most frequent among persons under 25 years of age, while deaths from falls and

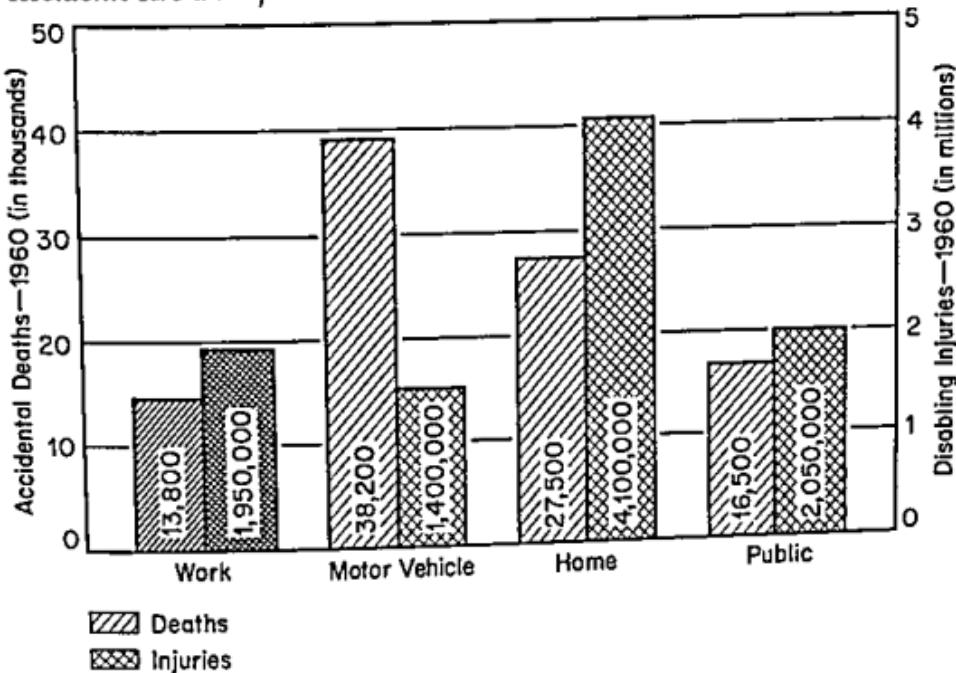


FIGURE 1:10. Accidental deaths and disabling injuries.

firearms occur more frequently in the older age groups. The majority of transportation deaths occur in the adult population.

The fact that the number of fatalities in public accidents has remained quite constant in the face of greater use of public transportation and the great increase in the use of recreation facilities is testimony to the effectiveness of safety measures and increased public safety education. The water safety programs of the American Red Cross, the hunter safety classes of the National Rifle Association, and the water safety programs of the U.S. Coast Guard are among the programs that have contributed to the saving of many lives that otherwise would have been lost in public accidents.

### WHY DO WE HAVE ACCIDENTS?

In order to establish effective accident prevention measures, it is important to be able to isolate basic accident causes. This is not always easy to do. In the early days of safety work there was a tendency to accept the most obvious condition as the cause. Frequently, it was not a basic accident cause but merely a description of what took place immediately preceding the accident's occurrence. For example, it was easy to determine

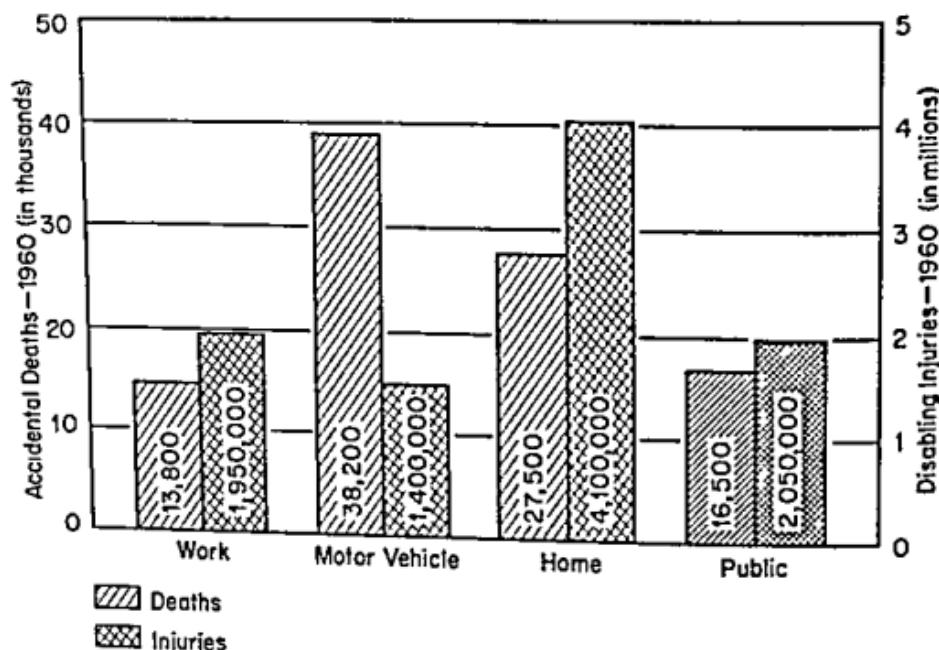


FIGURE 1:11. Accidental deaths and disabling injuries.

if a driver was on the wrong side of the road and then cite this as the cause of the accident. As accident prevention work became more sophisticated, it became necessary to look for deeper causative factors. Why was the driver on the wrong side of the road? Did he not see well? Was he asleep? Was he indifferent to his responsibility as a driver? Did he lack skill in the operation of his vehicle? There has been much research during the past quarter of a century to determine basic causes of accidents. However, there is need for much more research. There is also need for a greater application of the research findings that are available.

Basic causes of accidents have generally been divided into these two categories: (1) unsafe behavior or, as it is sometimes expressed, human failure; and (2) unsafe environment. Of these two, unsafe behavior is by far the most frequent basic accident cause.

#### UNSAFE BEHAVIOR

Unsafe behavior of the individual is considered by many persons to be the basic cause of about 85 per cent of all accidents. This is an important fact for the educator. It means that there is a great possibility of reducing accidents through the educational process. This is particularly

true of preschool youngsters. By teaching young people the correct ways of doing things and developing in them positive attitudes toward the use of safe practices, their tendencies toward the performance of unsafe acts will be reduced. It is well for the person in accident prevention work to remember that the *correct way to do something is also the safe way*. Therefore, education in correct procedures is always a form of safety education.

Unsafe behavior can be divided into several important classes, most of which provide unlimited opportunity in the safety field through education of the persons involved. These classes include the physical limitations, knowledge, skill, habits, and attitudes of the individual.

**PHYSICAL LIMITATIONS.** Many accidents are the result of persons attempting to perform acts for which they lack the physical capabilities. This accident cause can be controlled by educating the individual to the extent of his physical limitations and showing him how to work within them. This has been demonstrated successfully in the training of physically handicapped workers. When the handicapped worker is familiar with his limitations, is properly equipped to do the job, and given instruction in the correct performance of the job, his safety record is as good as or better than that of the average worker. Also, it is important, especially in industry, to determine the physical needs of the particular job and to select only those persons with the physical capacity to perform the job with a reasonable degree of safety. Periodic physical examinations to determine possible weaknesses and proper conditioning to meet the physical demands of the activity are additional safety precautions.

**KNOWLEDGE.** Lack of knowledge of performance of the task or the hazards involved is another cause of accidents. Thorough understanding of proper performance of the job to be done and knowledge of the hazards attendant on its performance will eliminate many accidents. This fact provides broad possibilities for accident reduction through proper education. Driver education, training for various industrial processes, and education relating to activities in the home and recreational pursuits will provide the necessary knowledge for the individual to live safely.

**SKILL.** Performing a task beyond the limitations of the capacities of an individual's skills can lead to an accident. This suggests that persons should be trained to perform tasks to the very best of their abilities. Conducting training programs to develop competent skill is a basic technique of accident prevention.

**HABITS.** Actions that are repeated over and over become habits. When

persons develop habits in doing things they tend to respond to given situations more or less automatically. This is true whether the habit is the correct or incorrect response. It is readily apparent that proper habits lead to safe practices while improper habits lead to accidents. It is preferable to educate the young person in safe practices so that he will develop habits of safe performance. It is more difficult to break fixed habits that are incorrect than to develop good habits from the beginning. Thus it is important to provide driver education for all students before they acquire a driver's license. When driver education becomes universal there will undoubtedly be a reduction in traffic accidents.

ATTITUDES. There is quite general agreement that one of the most important causes of accidents, particularly in motor vehicles, is the attitude of the individual. The development of positive attitudes toward driving or the performance of other tasks is a most effective safety measure. But it is difficult to determine just what a *good attitude* really is. At the present time, there are no tests that will predict successfully just how an individual will react in any given situation. As additional research is conducted it becomes more apparent that persons with cautious, conservative, socially acceptable behavior patterns are less susceptible to accidents.<sup>2</sup>

There is evidence to suggest that a positive relationship exists between a person's adjustment to his total environment and his attitudes toward safe practices.<sup>3</sup> The student with poor grades, a record of truancy, and a lack of participation in school activities is more likely to have a poor driving record than the good student who participates successfully in activities of his school and community. Moreover, driving a car can contribute to improper adjustment to scholastic responsibilities. A recent study revealed that, "poorer students are more likely to know how to drive, to have licenses, and to own their own cars."<sup>4</sup> From the viewpoint of safety education, it is desirable to develop a socially well-adjusted individual with a positive outlook on life. This will develop positive attitudes toward safe practices that will lead to his personal safety in the home, at work, in recreational pursuits, and in the operation of motor vehicles.

<sup>2</sup> The Eno Foundation for Highway Traffic Control, *Personal Characteristics of Traffic-Accident Repeaters* (Saugatuck, Conn.: The Foundation, 1948), pp. 51-52.

<sup>3</sup> Ross A. McFarland and Roland C. Moore, *Youth and the Automobile* (New York: Association for the Aid of Crippled Children, 1960), p. 12.

<sup>4</sup> Allstate Insurance Company, *A Teenage Pattern* (Skokie, Ill.: Allstate Insurance Co., 1960), p. 11.

### UNSAFE ENVIRONMENT

Although a great majority of accidents can be said to be the direct result of unsafe human behavior, a very large number are products of an unsafe environment. An unsafe environment may be a basic cause of at least 15 per cent of all accidents. Thus, education in the proper selection, care, and use of machines and equipment and the control of conditions of the environment can be effective means of preventing accidents.

In any complex, industrialized society there will be numerous machines and types of equipment that will present hazardous situations to individuals. Also, there will be conditions of order or disorder of the physical elements within the environment that will influence the extent of the accident involvement of persons who inhabit it. The hazards of the environment will be considered as those relating to machines and protective equipment and those relating to conditions within the environment.

**MACHINES AND PROTECTIVE EQUIPMENT.** As society grew in its complexity, there was a growth in the use of machines to meet the demands of people. The operation of these machines and other equipment involved hazards inherent in the devices themselves, as well as hazards related to the conditions of their use.

Engineers work continuously to reduce the hazards within the machine. Guards have been placed on machines to prevent workers from becoming involved in their operation. Seat belts are placed in airplanes and automobiles. Protective equipment, like hard hats and shatterproof glasses, has been designed to reduce exposure to hazards. But all of these things require an adjustment to their use by the individuals involved. Acceptance of protective devices is now quite general. This is due largely to efforts of safety engineers and persons responsible for the prevention of accidents. Workers now use machine guards, hard hats, and protective eyeglasses without question. The general public is increasingly aware of the benefits of seat belts and uses them in its automobiles.

Machines and equipment are designed to do specific jobs and using them beyond their limitations creates hazardous situations. The worker using the wrong tool, the boy riding a bicycle too large for him, or vacationists filling a rowboat beyond its capacity are all examples of hazardous conditions created by misuse of the devices involved.

Operating machines or using protective equipment in an unsafe condition can be just as dangerous as using them to perform tasks for which

they were not intended. It is a common practice in industry to develop programs of preventive maintenance to extend the life of the machine and to protect the life of the operator. Periodic inspection and proper lubrication of an automobile are preventive maintenance practices that will reduce motor vehicle accidents.

CONDITIONS. It has been said that "an accident is a perfectly natural product of an unorganized way of life."<sup>5</sup> Conditions within the environment that lack a quality of order or organization are spawning places for accidents. This is true whether they are in the home, industrial plant, public place, or on the highway. Disorder in the environment becomes a basic accident cause. Engineering techniques have been applied to remove obstacles to the orderly and efficient flow of both vehicular and pedestrian traffic. General principles of good housekeeping should be followed to create a safe environment. Floors should be swept and kept free of debris and slippery materials. There should be specifically designated storage places for tools and equipment, and they should be kept in their places. A general atmosphere of orderliness within the environment is a sound accident prevention measure.

### ATTACKING THE ACCIDENT PROBLEM

The problem of accident prevention must be approached in a scientific and businesslike manner. The old method of "posters and pep talks" that formerly were instituted following a serious accident will no longer suffice. Frequent use of the slogan, "Safety First," has proven to be an inadequate solution. It has been shown that the only really effective means of developing a lasting program of accident prevention is to apply the techniques that are used in the solution of any other business problem. Since safety is a management responsibility, management must assume the leadership for initiating and conducting a comprehensive safety program. Management must also provide an adequate budget to support it. There must be a gathering of the necessary facts to determine the dimension of the problem, and adequate records and reports must be maintained and interpreted by competent persons. When, through an analysis of the facts, the most critical safety needs are determined, an effective accident prevention program must be developed to eliminate the causes of the accidents. This proven approach to the solution of the accident problem will be discussed in detail in Chapter 5.

<sup>5</sup> Herbert J. Stack and J. Duke Elkow, *Education for Safe Living* (Englewood Cliffs, N.J.: Prentice-Hall, 1957), p. 37.

## SUMMARY

The social and economic losses resulting from accidents of all types in the United States have become a challenge to the nation. The complex, mobile and highly mechanized way of life in 20th-century-America has contributed to this condition. The first awareness of this problem was essentially economic. With the advent of workmen's compensation laws industry was virtually forced to concern itself with the prevention of accidents. Mounting tolls of death and injury also had an emotional impact that brought the social aspect of the problem into focus.

A new profession has been born. There are now thousands of persons who devote their professional lives to accident prevention and safety education work. They are found in schools, industries, and various public agencies. They have changed the approach to "safety" from the relatively ineffective, emotional appeal to the more orderly and businesslike process of the comprehensive accident prevention program. They look for facts and build prevention programs based on the needs revealed by the facts, and conduct research to determine basic accident causes. Through work based upon such findings, they eliminate these causes through education, enforcement, and engineering. Their work has resulted in the conservation of vast national resources, both human and economic. As society becomes increasingly mechanized and complex there will be an ever increasing need for the services of the practitioners of this profession.

## ACTIVITIES

1. Determine what agencies maintain accident records in your community. Prepare charts showing deaths and injuries in the community over a five-year-period in home, industry, public, and motor vehicle accidents. Explain the problems of obtaining accurate data in each classification.
2. Prepare a chart showing the five principal causes of traffic accidents in your community during the past year.
3. Prepare a graph showing the trends in deaths and injuries in either home, industry, public, or motor vehicle accidents during the past 20 years. Explain the reasons for the trend in the death rate.
4. Make a graphic comparison of deaths for school-aged children in accidents and diseases.
5. Determine the economic cost of traffic accidents in your city and state during the last calendar year.

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## Evolution of the Accident Prevention Movement

PERSONAL PROTECTION and safety have been problems of man since the beginning of time. His very existence was dependent upon his ability to survive in a hostile and hazardous environment. To insure his personal safety, man devised crude weapons to protect himself against his enemies and built primitive shelters for protection against the elements. However, with the continuous growth of populations and the ever increasing complexity of society, there was a gradual refinement of these protective measures. The individual received refuge from his personal and natural enemies through the collective strength of the tribe, the state, and the nation. But accidents, those unplanned acts or events resulting in injury or death to individuals or destruction of property, were largely considered to be inevitable. They were either predestined events over which the individual had no control, or they were mystic punishments being inflicted upon a person because he had displeased the gods.

While society was primitive, feudal, and agrarian in nature, there was little thought of organized accident prevention. It was not until the fundamental change brought about by the gradual transfer from a simple agrarian system to the more complex industrial economy that safety of the individual became a major concern of society. This change was due in part to increased hazards involved in the industrial process, to increased economic implications of employee injuries, and to increased moral consciousness of the people. Public concern increased because of the dramatic effect of multiple accidental deaths and injuries resulting directly from the

increasing complexity of the industrial environment. From this new, industrially oriented society grew the forces which were to spawn the events that have led, over a relatively brief period of history, to the concepts of accident prevention that are held today.

### FORCES INFLUENCING THE GROWTH OF SAFETY

Sound accident prevention programs are the result of careful and studied planning, not mere chance. To learn how accident prevention work has developed, it is necessary to study the interaction of the numerous forces that have caused such planning for safety to take place. In order to understand the history of the accident prevention movement, its evolution will be traced through the course of forces exerted by legislation, social mores, economic factors, disasters, and the development of mechanical safety devices. These influences were gradually felt with the coming of the industrial revolution and continue to exert a major influence in organized accident prevention work today.

#### LEGISLATION

The influence of legislation has been one of the strongest forces at work in all areas of the accident prevention field. "The year 1911 is generally considered the beginning of 'organized' accident prevention in the U.S. This year marked the passage of the first workmen's compensation laws. Although some states had enacted compensation laws before 1911, these early laws were held unconstitutional."<sup>1</sup> The desires of the people, as expressed by their legislators, have improved working conditions in factories, provided compensation for injured employees, required public places to meet minimum standards for fire protection, required motor vehicle operators to be licensed, provided for education of young drivers in high schools, and made provision for many more safety measures to protect all persons. Legislative acts to create safer conditions have been the direct result of many other forces that have influenced the safety movement.

#### SOCIAL MORES

The economic transition that is called the Industrial Revolution began in England around 1750. This great change brought with it many prob-

<sup>1</sup> "1911-1961, 50 Years of Progress," *The Journal of the American Society of Safety Engineers*, Oct. 1961, p. 8.

lems. A well-defined paternalistic relationship with the feudal lords traditionally had insured the security of serfs through the centuries. But the absence of such established relationships between employer and employee in the new industrial society led to uncontrolled competition and exploitation of workers. Long hours of work were required under conditions so unsatisfactory that public indignation ultimately forced legislative action to provide protection for the worker. Employers were gradually required to provide a safe working environment. They were also required to assume financial responsibility for employees who were killed or injured in the performance of their job.

When the Industrial Revolution came to America, many of the same conditions prevailed here that were present in the early days of industry in England. Legislation that defined employers' responsibility to their workmen was already being passed in Europe, and it soon followed to America. The two world wars brought to America an awareness of the value of human resources, and an awareness of the manner in which such resources are dissipated through accidental death and injury. Together with the predominantly humanitarian philosophy of the American people, these facts have led to a great public concern about the national accident toll.

Public officials and private citizens alike have expressed a desire for greater accident prevention efforts. National conferences on various aspects of accident prevention have been called by Presidents as far back as Herbert Hoover. These conferences, which frequently have been followed by governor's conferences within the individual states, have dealt with child safety, traffic safety, occupational safety, fire safety, and rehabilitation of the physically handicapped. Public officials responsible for the many aspects of accident prevention have participated in these meetings. These conferences also have been attended by private citizens representing media agencies, labor, women's groups, agriculture, religious groups, civic and service organizations, and the business and industrial communities. The co-operative efforts between public officials and interested citizens have resulted in recommendations, many of which have been enacted into law. Indeed, such efforts have proven to be important forces that have influenced the growth of the accident prevention movement.

#### ECONOMIC FACTORS

Economic pressures have become an important force in the expansion of accident prevention measures. With the increase in workmen's compensation laws, which have clearly established employers' financial

responsibility for workmen killed or injured on the job, there has been an increasing emphasis on safety. Under the provisions of these laws employers were required to assume tremendous potential liability risks in industrial accidents. Through economic necessity employers turned to insurance companies to spread these risks and thus avert financial disaster as a direct result of accident losses. The insurance companies responded with sound accident prevention measures designed to reduce claims costs. These measures have included accident records and reports, education, engineering, and other techniques which have proven to be effective means of accident control. Many industries and public agencies have followed the lead of the insurance industry and developed complete safety programs financed from their own budgets and staffed by their own personnel.

With so many fixed costs in the operation of a business, there is little room in modern industry for the extra costs and expensive interruptions of production that are a direct result of accidents. "The most compelling reasons for accident control, taken for granted that no executive or supervisor wants an employee to be injured, is that it is good business."<sup>2</sup> This factor has played an important role in the growth of the safety movement.

#### DISASTERS

Major disasters are spectacular events that focus the attention of the nation, and often the world, for a brief period of time on one particular hazardous condition. The dramatic pathos generated by the misery and destruction that always lies in the wake of such disasters arouses public sympathy. There usually are demands for investigations and the development of preventive measures to provide security against a recurrence of the disaster. Frequently, when the immediate impact of the disaster has passed, public apathy causes the event to pass with no lasting effect. Nevertheless, the force of public interest in disasters has resulted in many measures that have provided a greater protection for the people of America, particularly in the area of public accidents. Some examples of such measures include the following:

1. Legislation requiring doors of public building to open out to avert fire losses in public buildings.
2. Flood control programs devised to prevent recurrence of loss of life due to flood conditions.

<sup>2</sup> Maxwell N. Halsey (editorial consultant), *Accident Prevention* (New York: McGraw-Hill, 1961), p. 157.

3. Disaster control programs to project into the future their demonstrated value in times of emergencies.

A list of some major disasters that have occurred in the United States during the past century is found in Chapter 17.

## MECHANICAL DEVICES

A number of mechanical devices and protective equipment have been developed that have contributed materially to the safety of persons in various activities. This has been particularly true in industry. The Westinghouse air brake in 1868 and the automatic coupler in 1885 represented great improvements in railroad safety. The development of the self-starter, hydraulic brakes, and safety glass are proven safety features in automobiles. The production of such items of protective equipment as hard hats, safety glasses, seat belts, radar, and many other such devices has made daily activities safer for all persons in the nation. Such devices have been important forces in improved safety conditions because they have been adopted as integral parts of sound accident prevention programs. In many cases their use has been required by law.

## AREAS OF DEVELOPMENT

The growth of accident prevention activities has varied greatly within the accepted areas of safety. This has been due to a variety of factors. Safety measures are most readily adaptable when large groups are brought together under controlled conditions, when the public interest is involved, or when there are legislative and economic factors present. For these reasons progress has been made at very different rates in accident prevention work in industry, schools, home, and traffic. In this section the growth and development of the accident prevention movement will be traced through the various areas of emphasis in the safety field.

### MOTOR VEHICLE

Although man had conceived and experimented with the concept of a self-propelled vehicle for several centuries, it was not until the late 1800's that the automobile as we know it today really began to emerge.<sup>3</sup> By the

<sup>3</sup> General Motors Corporation, *Transportation Progress* (Detroit, Mich.: The Corporation, n.d.), pp. 5-40. Reprinted from *The Turning Wheel* by Arthur Pound.

year 1900 numerous makes of vehicles were being manufactured, but the total number in use was still so small that their social and economic impact had not yet begun to be felt. However, the automobile industry developed rapidly and, with its development, many problems resulting from this new mode of transportation began to appear. With the introduction of mass production techniques within the automotive industry, the price of motor vehicles was brought within the range of millions of potential users. The resultant concentration of vehicles created problems of congestion and an accident problem that was to become a serious drain on the human and economic resources of the nation.

Initially, automobiles were driven on roads designed to carry horse-drawn vehicles. Their operation was governed by laws and enforcement procedures that were developed to meet the needs of an era of horse-drawn transportation. Education in the use of motor vehicles was virtually nonexistent. It is, therefore, readily understandable that means of controlling traffic accidents lagged as they did. However, persons close to the problem were aware of this condition. In 1905 Connecticut and Massachusetts enacted laws requiring a license to drive. As early as 1925 a national committee was organized to study the need for uniformity of traffic laws and ordinances.<sup>4</sup> Law enforcement agencies began to develop techniques to deal specifically with problems of motor vehicle operation. Highway officials were designing hard-surfaced roads to meet the needs of motorized traffic. Courses of instruction in driver education were introduced in the high schools beginning in the 1930's. Despite all of these efforts the traffic toll rose to nearly 40,000 in 1941. Preoccupation with the problems of a world war halted the progress of effective attention to the traffic problem temporarily.

With the lifting of wartime restrictions on travel and the return to normal production of automobiles following the war, the highway safety problem again came into focus. It was of such proportion that in 1946 President Truman called the first President's Conference on Highway Safety.<sup>5</sup> In essence, he informed the governors of the states and their traffic officials that the problem was so great that if it were not solved at the state level it would have to be solved by the Federal Government.

The delegates assembled at the President's Conference were the technicians within their respective fields. Through their years of experience in

<sup>4</sup> National Committee on Uniform Laws and Ordinances, *Uniform Vehicle Code* (Washington: The Committee, 1956), p. iii.

<sup>5</sup> The President's Highway Safety Conference, *Action Program* (Washington: U.S. Government Printing Office, 1946), p. v.

highway transportation, they had developed an understanding of the needs for control of the traffic problem. In this working conference they prepared recommendations for control of traffic accidents in the form of an Action Program that has become the basic framework for effective control of traffic accidents. It has become the yardstick against which traffic control activities of cities and states are now measured. The effectiveness of the action program is attested to by the fact that, despite the tremendous increase of highway traffic, the fatality rate on the basis of miles traveled was reduced by more than half in a period of 15 years, and the rate is still decreasing. The National Safety Council uses the Action Program as the basis of its *Annual Inventory of Traffic Safety Activities*, which measures effectiveness of programs in all states and the major cities of the nation.

The Action Program recommendations cover the following areas of control of motor vehicle accidents:<sup>6</sup>

Laws and Ordinances

Accident Records

Education

Enforcement

Engineering

Motor Vehicle Administration

Public Information.

## HOME

The development of effective measures of control of safety in the home has been a most difficult problem. The National Safety Council, the U.S. Bureau of Public Health, local health departments, insurance companies, and many other agencies, both private and public, have been vitally interested. But inability to develop techniques of supervision and enforcement of safe practices in the millions of homes throughout the nation has made it necessary to rely almost wholly on education as a means of controlling home accidents.

Home safety education has been conducted both through the schools and the various means of public education. Also, there has been considerable legislation relating to various aspects of home safety, such as proper labeling of poisonous products, standards for electrical wiring and use of electrical appliances, regulation of the commercial use of plastic containers,

\* The President's Highway Safety Conference, *op. cit.*, pp. 1-24.

and many other factors. In home economic classes, future homemakers are taught safety in home management and the raising of children. Safety education relating to many aspects of home living is integrated into numerous subjects of the school curriculum. Home safety checklists have been distributed through the schools and follow-up programs have led to greater safety in the home. The agencies mentioned above have prepared thousands of pieces of literature on many aspects of safety in the home and distributed them in quantities running into the millions. Parent-teacher and women's organizations have conducted programs and projects dealing with safety in the home. Wide use has been made of newspapers, magazines, radio, and television to educate the public in safe practices in the home.

Home safety education is a continuous and never-ending process that has proven to be valuable. The death rate for home accidents has declined steadily, if not spectacularly, for many years. Even with the great population increase, only 27,500 home fatalities were reported in 1960 as compared with 30,000 in 1930.

#### INDUSTRY

The organized accident prevention movement had its beginning in the field of industry. This was due to a combination of forces that made economic survival dependent upon some means of controlling losses due to accidents. Although pressures were brought to bear earlier, accident prevention work as it is now known is a product of the 20th century. As the insurance industry moved into the picture following the enactment of workmen's compensation laws, it became necessary for industry to develop safety measures in order to obtain needed insurance protection. The speedup of production as a result of demands on industry in World War I and the general introduction of mass production brought advanced production techniques and new hazards. At the same time, industry had the economic resources for accident prevention work as well as conditions under which it could control and supervise the actions of employees. Thus, out of necessity, industry became the first segment of society to embrace modern concepts of accident prevention, and the result has been the conservation of both human and economic resources. The positive results of accident prevention measures in industry are reflected in a spectacular reduction of on-the-job fatalities. Deaths have been reduced from 20,000

in 1929 to fewer than 14,000 in recent years. During this period the rate of deaths per 100,000 population has been reduced from 37 to 21.

Industry has developed and refined many of the techniques of accident prevention that have been applied successfully in other areas. In addition, it has recognized its responsibility to the public and financed, to a substantial degree, various types of accident prevention measures in off-the-job safety programs.

#### PUBLIC

Public accidents include those not occurring in industry, home, and motor vehicles. This would cover many areas of man's activities such as recreation, travel other than in motor vehicles, and the use of firearms outside the home. Like home safety, it is a broad area of activity depending largely on education as a means of control. However, public safety is subject to much greater supervision and influence of legislation than safety in the home.

Educational programs through schools and other agencies and the use of public media have been important factors in control of public accidents. Swimming instruction by the American Red Cross, firearms safety programs of the National Rifle Association, and water safety programs of the U.S. Coast Guard and the Coast Guard Auxiliary have contributed to a reduction of public accidents. Supervised recreational programs in nearly every major community and at public recreational areas have made substantial contributions to public safety.

Legislation has been an important measure of controlling public accidents. Safety restrictions on all modes of public transportation, licensing of hunters, abolition of sale of dangerous fireworks, and fire regulations in public buildings are examples of controlling accidents in public places. A good safety program provides protection against liability actions. This fact has favorably influenced the enforcement of desirable safety measures in the public interest. The continuous reduction of the public accidental death rate from 16.3 in 1930 to 9.2 in 1960 is evidence of the effectiveness of the measures that have been taken to create safety in public places.

#### SCHOOL

Formal education in the schools and mass education of the public have played important roles in the development of the accident prevention

movement. This is true because of the fundamental nature of the accident problem. Since accidents result from human failures, there is need for education and training in safe practices in nearly every type of human endeavor. Education of the general public through news media and the distribution of literature are the only effective means of achieving the objectives of some safety programs. Newspapers and magazines have been equally effective educational media in public education for all types of accident prevention.

The public, private, and parochial schools all have participated in safety instruction and activities. As early as 1919 some larger city school districts were experimenting with programs designed to reduce accidents among school-aged children. In Detroit an analysis of accidents to school-aged children was followed by the construction of a course of study in safety for the elementary schools and the preparation of teachers to provide the instruction. In Kansas City, Missouri, the schools, in co-operation with the local safety council, selected 12 schools for the development of an experimental program of safety instruction and the organization of school safety councils. Dr. E. George Payne, president of Harris Teachers' College in St. Louis, Missouri, was one of the early leaders in school safety education. In 1919 he conducted studies in the Wyman School in St. Louis that showed how safety education could be correlated with nearly all subjects taught in elementary schools. The National Safety Council organized a Safety Education Section in 1919 to cope with the problems of preschool and school-aged youth. In 1920 a State Manual on Safety Instruction was produced in Oregon.

The results of these early efforts in safety education have been most rewarding. Nearly every elementary school in the nation now provides some type of education for safe living in its curriculum. In spite of the tremendous increase in the number of school-aged children, the number of accidental deaths in the 5 to 14 year group was reduced from about 9,500 per year in the 1920's to 6,600 in 1960.

Safety education in secondary schools developed primarily as integrated instruction within established course offerings. However, with the introduction of driver education, a specific area of safety was established as a regular part of the school curriculum. Driver education is one of the newest areas of emphasis in the school program. Early classes of instruction were introduced in the early 1930's by Dr. Herbert J. Stack in New Jersey and Amos E. Neyhart at Pennsylvania State University. The pattern of behind-the-wheel instruction developed by Professor Neyhart at State

College High School in 1933 was the basis for this phase of the program for many years.

Although progress was retarded during the time of World War II, driver education expanded rapidly thereafter. However, many schools conducted pre-induction driver training programs during war years at the direct request of the armed forces.<sup>7</sup> In 1949 the National Commission on Safety Education called the first National Conference on High School Driver Education. This conference, held at Jackson's Mill, West Virginia, established, for the first time, national standards for teacher preparation and recommended policies for driver education courses.<sup>8</sup> In 1949 classroom driver education was made a requirement for graduation from California high schools. In 1952 Pennsylvania became the first state to provide state aid for driver education. Many schools now have separate courses in general safety education.

School administrators have shown an increasing interest in safety and driver education. The 18th Yearbook of the American Association of School Administrators published in 1940, entitled *Safety Education*, was devoted entirely to safety in the schools. The 1962 national meeting of school board officials had an important session devoted to the place of driver education in secondary schools.

Safety education instruction in the schools has been taught largely by teachers who realized the school's responsibility for this area, but most of them have had little or no preparation for this teaching responsibility. They have had to search out their own materials and prepare their own instructional programs. This was particularly true prior to the organization of the first college-level teacher preparation program conducted in 1928. Although there are now over 400 colleges and universities offering some instruction in safety or driver education, only a small percentage of new teachers receive safety education courses.

The rapid growth of driver education has been responsible for a large measure of the growth in college-level safety courses. About six states now require a teaching minor, or its equivalent, in safety and driver education to teach driver education in high schools. This has brought about full-time teaching positions in this field at many colleges and universities throughout the country. This trend will provide broader safety offerings for teachers

<sup>7</sup> The Military Training Division, Office of the Quartermaster General, *Pre-Induction Driver Education in Schools and Colleges* (Washington: The Quartermaster General), pp. 3-97.

<sup>8</sup> National Commission on Safety Education, *High School Driver Education, Policies and Recommendations* (Washington: National Education Association, 1950), pp. 3-78.

and higher quality courses taught by specialists in the field. A number of colleges have developed safety centers. These centers prepare teachers, conduct research, publish safety literature, and provide community leadership in many areas of safety.

#### FARM

Like home safety, safety on the farm is largely a matter of education. The activities of farm life are conducted under conditions providing little means of supervision or effective enforcement. However, many agencies have contributed greatly to safety on the farm. The U.S. Department of Agriculture, state and county agriculture departments, the Grange, 4-H Clubs, Future Farmers of America, and many other organizations prepare literature and conduct projects and activities directed toward greater safety in farm living. Although it is difficult to measure how effective these measures have been, it is certain that they have contributed to the reduction of accidental death and injury in the nation. The death rate for farm accidents dropped from 61.9 in 1950 to 55 in 1960.

#### FIRE

Fire prevention and protection have a longer history than other phases of safety, although they did not contribute materially to modern concepts of accident prevention. Fire protection activities, which date back to colonial times, were originally developed by the insurance companies, as were many fundamentals of present-day industrial safety programs.

In the early days of the fire insurance industry, there were no fire departments as we know them today. In order to protect the property they insured, the individual companies organized fire brigades of their own. Many of the older companies still have in their archives company insignia that were placed on homes and commercial buildings that they insured to identify them to their company fire brigades. This practice was both expensive and highly inefficient. However, it was a forerunner of modern fire departments that exist on a professional or at least a volunteer basis in nearly every community in the nation. "There are approximately 1,200 paid fire departments and 14,000 volunteer fire departments in the United States."<sup>9</sup>

One of the basic principles of fire fighting is to be able to get equipment-

<sup>9</sup> Gilbert E. Stecher and H. N. Lendall, *Fire Prevention and Protection Fundamentals* (New York: The Spectator, 1953), p. 501.

ment to the scene of the fire at the earliest possible moment. Therefore, the advent of the motor vehicle greatly improved the effectiveness of fire protection by replacing the slower horse-drawn fire engines with faster motorized equipment. Many other mechanical improvements such as automatic alarms, overhead sprinklers, improved pumping devices, and good water pressure systems have provided additional protection against fire. The development of fire-resistant building materials has been another means of reducing fire hazards.

One of the greatest incentives for the improvement of fire protection has been the economic factor represented by the present fire insurance rate structure. This provides for a rate classification for communities based on the fire protection potential of their fire departments. By meeting established standards based upon the type of water pressure system, the number and location of fire stations, the quality of fire fighting equipment, the quality of fire department personnel, and other significant factors, the community can qualify for fire insurance classifications that will reduce the fire insurance rates on both dwellings and commercial buildings. It is, therefore, economically advantageous to the taxpayers of a community to support a high quality fire department in order to qualify for reduced insurance premiums on their property.

Since most fires, like other types of accidents, are the result of human failure, there is a need for educational programs in the schools and among the general public. Public agencies and insurance companies have advanced such fire safety educational programs. Fire Prevention Week each October makes good use of both of these educational techniques. The Junior Fire Marshal and other programs have been utilized by the schools. Many fire departments now conduct effective fire inspection programs for both private dwellings and commercial buildings in the community.

Legislation has made its contribution to fire prevention and protection as well as to other areas of safety. There are now numerous state laws and local ordinances requiring acceptable standards for building construction and the occupancy of public buildings. Although the fire losses in the nation are still very costly in terms of deaths and property losses, these varied preventive measures have acted as an effective means of fire loss control.

#### AGENCIES IN THE ACCIDENT PREVENTION MOVEMENT

Many people express the opinion that something should be done to prevent accidents. Frequently these persons are not aware of the many

agencies that provide staff services and spend millions of dollars annually toward the realization of this important objective. Both public and private agencies have contributed to the progress of the safety movement. These organizations have provided staff services, finances, materials, professional assistance, and promotional efforts in the safety field. Their contributions have varied in nature and scope, depending on the interests and basic objectives of the agencies themselves. These agencies have included:

1. Public agencies such as departments of local, state, and federal governments;
2. Quasi-public agencies such as colleges or the National Education Association;
3. Private organizations such as insurance companies and associations of automobile manufacturers;
4. Citizen support organizations such as the National Safety Council.

In order to understand the true nature of the growth and development of the safety movement it is necessary to know something about these organizations and the contributions they have made.

#### CENTER FOR SAFETY EDUCATION

The Center for Safety Education, established at New York University in 1938, was the first university department in safety education on the graduate level in the country.<sup>10</sup> The four primary purposes of the Center are: leadership training, research, publications, and field services. Through the development of these four objectives the influence of the Center has been widely felt as safety education has grown throughout the nation. Many leaders in the field today have studied at the University or in programs that have been conducted by the Center in many different states. More than one half of the doctoral-level research programs in the safety education field have been completed under the direction of the Center at New York University. In addition to these programs, the Center has one of the largest industrial safety education programs in the nation and has conducted over 100 regular safety courses for the armed forces. Through its field service program the Center has been one of the most successful promoters of all phases of safety education in the nation.

The Center was founded and initially supported under a grant from the Association of Casualty and Surety Companies. Today the basic fi-

<sup>10</sup> The Center for Safety Education, *The Center for Safety Education* (New York: The Center, n.d.), p. 3.

nancing of the Center program comes from the Insurance Institute for Highway Safety. The first director of the Center was Dr. Herbert J. Stack, an outstanding educator and an acknowledged leader of the safety education movement. Through his teaching, writing, lecturing, and consulting activities, Dr. Stack has provided outstanding leadership to the safety education movement during the formative years of its development. The present director of the Center, Dr. Walter A. Cutter, brought a long and distinguished career in the safety field to his position.

#### **HIGHWAY TRAFFIC SAFETY CENTER**

The Highway Traffic Safety Center was established at Michigan State University in 1956 as the result of an extensive study of the needs for such an institution by the University under a grant of the Automotive Safety Foundation. The Center, financed by the State of Michigan, was developed to provide a broad program of training, research, and community assistance to bear in the solution of traffic problems for the state. Assistance was provided in traffic law, police administration, community support efforts, engineering, and education. A doctoral-level program was established to provide leadership training and research in the field of driver education. The broad program of the Center was phased out in 1961. However, a basic program of field service, teaching, and research continues today. The comprehensive program conducted by the Center proved of value to the state, and the concept of a state or regional center has encouraged the development of similar programs in other institutions. There are now safety center programs at Oklahoma A. & M., Southern Illinois University, the University of Maryland, and others. Similar programs are being developed at a number of other institutions.<sup>11,12</sup>

#### **NORTHWESTERN UNIVERSITY TRAFFIC INSTITUTE (NUTI)**

This Institute has served as the seat of national traffic training for police officers and motor vehicle administrators since its inception in 1936.<sup>13</sup> NUTI was conceived by, and for many years operated under, the

<sup>11</sup> Association of State Universities and Land-Grant Colleges, *University Transportation and Accident Prevention Centers* (Washington: The Association, 1962), pp. 3-43.

<sup>12</sup> Daniel P. Webster (ed.), *Organization and Status, College Safety Centers and Institutes, 1959-1960*, mimeographed (Chicago: National Safety Council, 1960).

<sup>13</sup> The Traffic Institute of Northwestern University, *Program and Objectives* (Evans-ton, Ill.: Traffic Institute), p. 4.

direction of Col. Franklin Kremel, an outstanding leader in the field of police traffic problems. The program is now directed by James Slavin who has had many years of experience as a traffic enforcement administrator. For a number of years the Institute worked in co-operation with the Traffic Division of the International Association of Chiefs of Police (IACP), which maintained offices at the Institute until it moved to the home office of IACP in Washington, D.C. The Institute also co-operates with the American Bar Association in conducting the Traffic Court Conference program. The program of the Institute includes research in traffic safety, police department traffic surveys, and publications, in addition to its extensive training program.

The Traffic Institute is located on the campus of Northwestern University in Evanston, Illinois. Its program is supported by: (1) grants from many national organizations, particularly the insurance industry, (2) fees charged for courses, and (3) the sale of publications.

#### NATIONAL COMMISSION ON SAFETY EDUCATION (NCSE)

This 12-member Commission of outstanding educators was appointed by the National Education Association in 1943. The Commission governs the activities of a professional staff under the direction of an executive secretary, Dr. Norman Key. The Commission is based at National Education Association headquarters in Washington, D.C.

The activities of the Commission cover the entire field of safety education at all levels of instruction. It provides research data, has a broad list of publications, serves as consultant to educators at all levels, and its staff members perform as program participants on safety education at numerous local, state, and national education meetings.

The many activities of the Commission include conducting the following national conferences: High School Driver Education, the National Conference on Safety Education by Colleges and Universities, the National Conference on Safety Education in Elementary Schools, and the National Conference on School Transportation. It acts as secretariat for the American Driver and Traffic Safety Education Association and conducts the National Student Traffic Safety Program. These and other functions of the Commission are financed largely through contributions of private industry and foundations that have an interest in the objectives of the Commission.

**AMERICAN ASSOCIATION OF MOTOR VEHICLE  
ADMINISTRATORS (AAMVA)**

As early as 1921 a number of motor vehicle administrators, recognizing the need for co-operative and uniform interstate consideration and action, assembled to exchange ideas and seek solutions to common problems. By 1932 it had become apparent that there was need to co-ordinate and expand this program, so the American Association of Motor Vehicle Administrators was formed. The Association is composed of members of the 50 states, Canadian provinces, the District of Columbia, Puerto Rico, and U.S. Federal agencies interested in traffic problems. The Association is financed from dues of member jurisdictions and grants from organizations such as the Automotive Safety Foundation, and the Insurance Institute for Highway Safety.

The Association's program deals with all common problems of motor vehicle administration including the following safety measures: driver licensing, driver improvement, enforcement, engineering, vehicle inspection and financial responsibility.<sup>14</sup> Headquarters for the Association are in Washington, D.C.

**ASSOCIATION OF STATE AND PROVINCIAL SAFETY COORDINATORS**

This is an association of the persons designated by the governors in the United States and their counterparts in Canada to assume the responsibilities of official co-ordination of traffic safety activities within their individual jurisdictions. Its objectives are to facilitate the co-ordination of activities of the various jurisdictions and to develop co-ordinated public education programs in the interest of traffic safety. Organized originally as an outgrowth of a national program to emphasize an attack on the problems of interstate travel during the vacation periods in a campaign called "Slow Down and Live," the activities of the Association have grown to assume a broader function. They now conduct year-round programs dealing with various aspects of control of traffic accidents. A program of in-service training for safety co-ordinators in state traffic safety management is conducted under the direction of the Center for Safety Education, New York University.

<sup>14</sup> Adapted from *The American Association of Motor Vehicle Administrators* (Washington: The Association, n.d.), pp. 3-11.

The Insurance Institute for Highway Safety assumed the responsibility of acting as secretariat for the Association until 1962. This function was originally performed by the Association of Casualty and Surety Companies.

#### NATIONAL SAFETY COUNCIL (NSC)

The organization of the National Safety Council in 1913 was an outgrowth of the first Cooperative Safety Congress held in Milwaukee, Wisconsin, in 1912. The Council, which was granted a charter by the Congress of the United States in 1953, has grown to be the most important safety organization in the world. In October of each year it conducts the National Safety Congress and Exhibition in Chicago. The Congress attracts about 15,000 leaders in all fields of safety from all parts of the world. The administration of the Council program operates through a departmental structure with a staff of about 350 persons.

The National Safety Council is one of the largest publishing organizations in the world. It develops a number of periodicals, technical papers, and a great volume of promotional literature dealing with various aspects of safety. One important activity of the Council is the gathering and interpretation of all types of accident statistics. Its annual publication, *Accident Facts*, is the outstanding source of accident statistics in the world. The Council also maintains the most complete safety library in the world.

The Council is divided into volunteer service units, called conferences, through which its various programs and activities are conducted. The broad coverage of the safety field by the activities of the Council is revealed in the membership organization chart shown in Figure 2:1. The School and College Conference, first organized as the Safety Education Section in 1919, is composed of five sections: higher education, driver education, elementary education, secondary education, and safety supervisors. This Conference publishes *Safety Education*, a magazine used by teachers in thousands of schools throughout the nation.

There are about 90 accredited chapters and 250 affiliated organizations of the National Safety Council in the United States. Although these chapters and organizations are members of N.S.C., each is an individually organized and financed community organization with its own directors and its own locally oriented program. The Council's field staff assists the local chapters in many ways and, through a subscription service, local chapters have access to the materials and program activities of the Na-

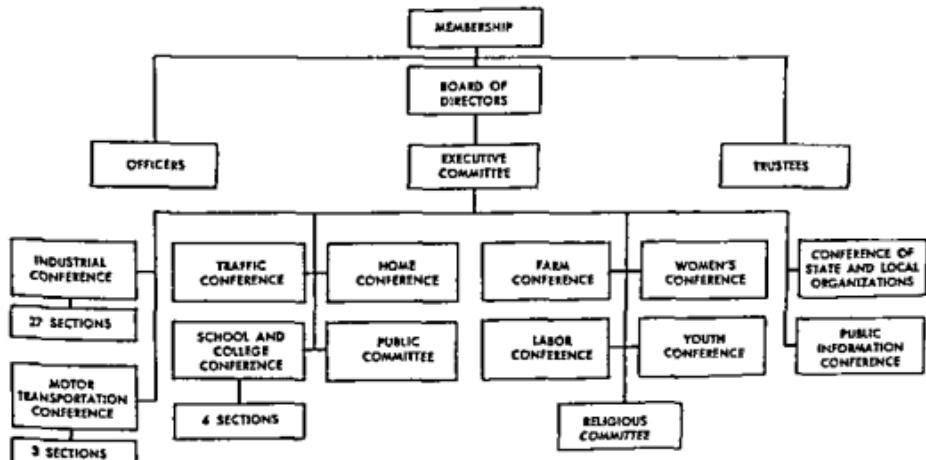


FIGURE 2:1. The National Safety Council membership organization.

(Courtesy National Safety Council)

tional Safety Council. The headquarters of the Council is in Chicago. Its broad program of services is financed largely through contributions from industry and through the sale of publications.

#### THE PRESIDENT'S COMMITTEE FOR TRAFFIC SAFETY

The President's Committee for Traffic Safety was formed in 1954 for the primary purpose of providing a permanent organization to carry on a program in support of the recommendations of the President's conferences on traffic safety. The Committee is composed of representatives of numerous segments of society through which citizen support for traffic safety can be generated. The President's Committee works through all appropriate organizations to stimulate and promote public interest in traffic safety, and through its Advisory Council maintains liaison with the various national organizations actively engaged in traffic safety activities. The Committee has functioned under such able chairmen as T. S. Peterson, president of Standard Oil Company of California, and William Randolph Hearst, Jr.

National and regional conferences on traffic safety, called by the President, have been conducted under the direction of the Committee. They have also encouraged follow-up governor's conferences, which have been held in many states. The Committee has a small staff with headquarters in Washington, D.C. The program of the Committee is financed jointly by

the U.S. Bureau of Public Roads and interested segments of business and industry.

#### ALLSTATE FOUNDATION

The Allstate Foundation was founded by the Allstate Insurance Company for the purpose of promoting worth-while community projects which include traffic safety. In 1952 the Allstate Insurance Company pioneered the field of insurance reductions for students having completed courses in high school driver education. In 1953 the Foundation instituted a program of scholarship grants to encourage the expansion of teacher preparation in the field of driver education. It now provides grants to about 40 colleges and universities for this purpose and has sponsored several courses for college instructors.

The Foundation has provided funds for research in driver education and conducted studies, particularly relating to young drivers. Its studies on the effect of car ownership and use on high school students has been an outstanding contribution. In 1962 it introduced a new driver simulator as a further means of promoting high school driver education. In addition to these activities, the Foundation has provided financial assistance for many local projects in the interests of traffic safety. Foundation offices are in Skokie, Illinois.

#### AMERICAN AUTOMOBILE ASSOCIATION (AAA)

The American Automobile Association was organized in 1902 and for over 60 years has conducted a nationwide program in the interest of American motorists. The Association, with headquarters in Washington, D.C., has member motor clubs in each of the states operated on a local membership basis and serving the interests of local automobile operators. The AAA has been concerned with problems of legislation, engineering, insurance, road maps, touring services, roadside services, and, of course, all aspects of traffic safety.

One of the most outstanding safety services of the Association has been its major contribution to the growth and development of the high school driver education program. The AAA textbook, *Sportsmanlike Driving*, was one of the first driver education textbooks. This book is part of a complete program of materials which include tests, teachers' manuals, workbooks and many source and research materials. Since 1937 it has

conducted courses to prepare teachers of driver education in all parts of the United States and Canada. Members of its staff have provided consultant services to many state and local education departments and have very successfully promoted all aspects of driver education. The Association develops and distributes a variety of driver education testing devices and arranges with dealers and manufacturers for the loan of automobiles for use in practice driving classes.

In addition to the work in driver education, the Association has been active in many other traffic safety projects. It develops lesson plans for elementary school traffic safety, distributes traffic safety posters in schools, sponsors school safety patrols, and conducts the National Pedestrian Protection Program, among other activities. Through the AAA Foundation for Traffic Safety, established in 1947, it also has made substantial contributions to research in the field of traffic safety.

#### AMERICAN BAR ASSOCIATION (ABA)

The American Bar Association has shown a great interest in the traffic problem as it relates to the handling of traffic cases in the various courts. In order to upgrade traffic court procedures, the ABA has conducted studies and prepared publications in the field. In co-operation with the Northwestern University Traffic Institute they have developed and conducted, in all parts of the country, a series of Traffic Court Conferences for judges and prosecutors. This program, which has been in operation for over 10 years, has exercised a strong influence in the improvement of practices and procedures in the traffic courts of the nation. Offices of the Association are in Chicago, Illinois.

#### AUTOMOTIVE SAFETY FOUNDATION (ASF)

The Automotive Safety Foundation was established in 1937 as a non-profit organization for the purpose of promoting safe and efficient use of the highways. The work of the Foundation is now supported by more than 600 companies and associations representing a wide variety of interests in the motor transportation field.<sup>15</sup>

The Foundation's funds have been used to sponsor needed research in many phases of the traffic problem. It has been particularly interested in

<sup>15</sup> *Automotive Safety Foundation, ASF Report* (Washington: The Foundation, June, 1962), p. 17.

There are also numerous local, state, and federal organizations, such as the Department of Labor, the U.S. Bureau of Public Roads, and the U.S. Bureau of Public Health, that provide staff assistance grants for needed research projects relating to safety. State departments of education, motor vehicles, labor, and law enforcement are among state agencies contributing to the control of accidents.

### PROFESSIONAL ORGANIZATIONS IN SAFETY

As the accident prevention field has developed, there have been an increasing number of men and women who have devoted their professional careers to this work. As their numbers grew, they banded together for the purpose of individual personal growth and to improve the interests of their profession. Such professional organizations have made significant contributions toward greater safety.

#### THE AMERICAN ACADEMY OF SAFETY EDUCATION

The American Academy of Safety Education was formally organized in Chicago in October, 1962. The Academy is composed of some of the leading safety educators in the United States. Since the standards for membership are high, the organization will remain small. The Academy has no connection with any other educational or safety organization.

The basic objectives of the Academy are:

1. To recognize individuals who have made outstanding contributions to safety education, by election to the American Academy of Safety Education;
2. To provide for an interchange of ideas among Academy members and other leaders engaged in common professional activities;
3. To advise professional groups concerned with the advancement of safety education;
4. To recognize excellence in contributions to safety education wherever found.

#### AMERICAN DRIVER AND TRAFFIC SAFETY EDUCATION ASSOCIATION (ADTSEA)

The first professional organization of driver education teachers was established in Iowa in 1949. As other states organized similar groups, the presidents of the various groups met and, in 1956, organized the American

Driver and Safety Education Association. In 1960 this organization, then known as the American Driver Education Association, was granted full departmental status in the National Education Association. Efforts are being made to change its name back to the original one because the objectives of the organization are considered to be more than driver education alone.

It is the purpose of the Association to provide a professional group within the family of educators to promote the interests of safety and driver education and to provide opportunities for professional growth for its membership. It produces publications and research abstracts, and conducts an annual conference for the membership. Through the offices of the Association the interests of safety and driver education are officially represented at various local, state, and national meetings and conferences that relate to this field of education.

The Association is financed through membership dues and sustaining memberships of a number of national organizations that feel that the objectives of the Association serve a constructive purpose in the traffic safety field. The National Commission on Safety Education, with offices in N.E.A. headquarters in Washington, D.C., was largely responsible for the Association's organization. The Commission has served as secretariat to the Association since its inception.

#### **AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE)**

The American Society of Safety Engineers was organized in 1911 as the United Association of Casualty Inspectors. In 1914 it adopted its present name as more descriptive of the objectives of the organization. The Society was incorporated in the State of New York in 1915. Although the Society amalgamated with N.S.C. and operated as the Engineering Section of the Council from 1924 to 1947, it has operated independently since that time.

The objectives of the Society are dedicated to the development of the safety engineering profession. It maintains high membership requirements of both professional training and experience in the field of safety engineering. Associate memberships are granted to representatives of manufacturers of safety products. The Society has 70 chapters in the United States and Canada with a worldwide membership of 7,500.

The Society publishes a professional magazine, *The Journal of the American Society of Safety Engineers*. Through local chapters it also contributes professional talents to conducting a wide variety of safety

activities in support of all types of accident prevention projects. The annual conference of the Society is held in Chicago, at the time of the National Safety Congress. Offices of the Society are in Chicago.

#### INSTITUTE OF TRAFFIC ENGINEERS (ITE)

The Institute is a professional engineering society founded in 1930. It has a membership of over 1,700 persons professionally engaged in the traffic engineering field in all parts of the world. Membership requirements are based on education and experience that will qualify individuals to concern themselves with engineering problems related to planning, design, and operation of highway traffic facilities.

The Institute publishes a monthly journal, *Traffic Engineering*, and technical papers; develops standards and recommended practices in traffic engineering; and holds an annual meeting. The Institute of Traffic Engineers participates in many joint traffic safety projects with other national organizations such as the National Joint Committee on Uniform Traffic Control Devices and the National Committee on Uniform Traffic Laws and Ordinances. Mr. David M. Baldwin is secretary of the Institute, whose offices are in Washington, D.C.

#### AMERICAN ASSOCIATION FOR HEALTH, PHYSICAL EDUCATION AND RECREATION (AAHPER)

This Association, which is a department of the National Education Association, formed a Safety Education Division in 1959. The Division is composed of the following sections: (1) Driver and Traffic Safety, (2) Safety in Physical Education and Athletics, (3) Safety in the School Environment, (4) Recreational Safety, and (5) Home and Community Safety. The Association is predominately interested in physical education, but it has a natural interest in safety, particularly through its health education program. Many colleges conduct safety and driver education classes in either the health education or physical education departments. The Association has produced a number of publications in the field of safety, including the *Annual Safety Education Review*.

#### RESEARCH IN ACCIDENT PREVENTION

Research has played an important part in the development of modern techniques of accident prevention. Although the subject of research and research needs is discussed at greater length in Chapter 19, it should be

pointed out here that many of the problems arising in the evolution of the accident prevention movement have found their solutions through research. The first doctoral-level study in the field of safety education was the Ruth Streitz study, *Safety Education in the Elementary School*, completed at Columbia University in 1927. Since then over a hundred doctoral level studies have been conducted relating to many areas of safety, including aspects of human behavior as they are associated with safe practices. Research is certain to play an ever increasing role in safety in the future.

## SUMMARY

The accident prevention movement is a product of the 20th century. It was born in the field of industry where, largely due to legislative measures, accident prevention became an economic necessity. Industry also possessed the economic means and the elements of a controlled environment which are important factors in the development of an accident prevention program.

The rapid growth of the safety field has been the direct result of important contributing forces. The strongest of these forces has been legislation providing for the protection of the individual at work, at home, in the motor vehicle, and in public places. However, social mores, economics, disasters, and mechanical developments also have been important factors.

There have been many organizations working in the accident prevention field since 1900. They represent various segments of society including private industry, citizen groups, public agencies, and quasi-public organizations. These groups have provided needed leadership and finances for the development of the safety movement. Their efforts have been supplemented by the contributions of professional groups whose members have elected to make a particular aspect of accident prevention their life-work. All of these groups have provided funds and trained persons to conduct needed research and to make accident prevention work increasingly effective in the solution of the important problem of conservation of human and natural resources.

## ACTIVITIES

1. Describe how legislation has influenced safety in all areas. Cite legislation in the areas of home, industry, public, and motor vehicle safety.

2. What contributions to safety have been the direct result of major disasters?
3. Prepare a list of national organizations that have made a contribution to the safety movement. State the major contributions of each.
4. Visit a local office of a national organization that is active in safety work. Prepare a written report describing the safety activities of the organization in your community.
5. Prepare a list of the contributions to the safety movement made by professional safety groups.

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# A Philosophy of Safe Human Behavior

THE ROLE PLAYED by safety in a person's philosophy will help determine the extent of his successful contribution to society and the fulfillment of his personal ambitions. Many lives have been lost and many permanent injuries sustained which have shortened or ended careers before they fully started or matured. This waste of human talent, as described in preceding chapters, could have been avoided if each person would have analyzed safety values and incorporated them in his personal philosophy of life.

In the broad sense, *a person's philosophy of life is the integration of all the acquired knowledge and experiences into a pattern of human behavior.* This behavior is controlled by values, attitudes, and habits which, in turn, are developed and modified by the acquisition of knowledge and experiences.

A person must integrate safety into this philosophy of life since safety is an integral part of all human activity. The contribution of safety to a person's activities must be based upon sound factual information and leads to the successful completion of the activity. Hence, safety should become part of a person's value structure. This will integrate accident prevention procedures into daily activities, force consideration of potential hazards and risk involvement before engaging in a new activity, and make safety a part of daily planning and living.

*Safety does not accompany a philosophy free of risk nor does it imply the development of a "Caspar Q. Milktoast" personality. Some of the most*

adventuresome people in the world today are also some of the most "safety conscious." Projection into space is man's most adventuresome activity within the history of the world. At the same time it is the most hazardous of all adventures. Yet, there have been no refusals from the

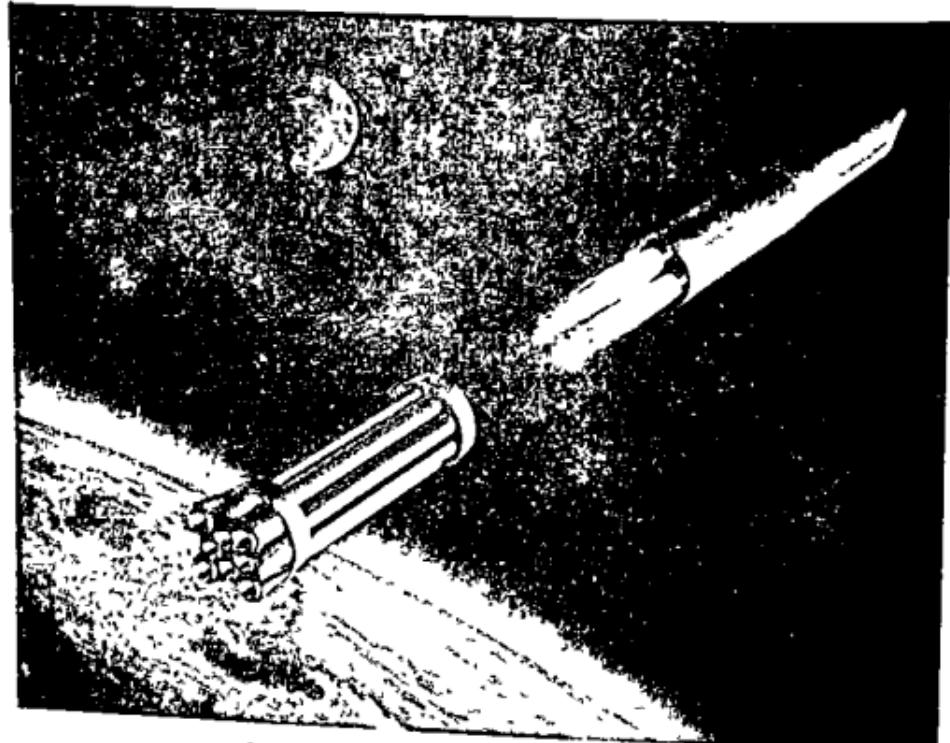


FIGURE 3:1. Separation of space missile from first stage propulsion system. The development and launching of manned and unmanned space flights requires adherence to elaborate and detailed procedures designed to insure the safety of personnel and the successful flight of the missile.

(Courtesy Lockheed Missiles and Space Company)

group selected for these adventures. Safety has been built into every step of the "space program." Without the elaborate engineering and construction tests and the detailed count-down procedures, the successful flights would not have been possible. Only when all systems are "GO" or, to state it another way, "only when every safety precaution has been assured" will the flight be launched.

Safety has been integrated into the major adventures of society. Within these activities safety has been a prime contributor towards success. This spirit of "safety for greater adventure" and "safety as a positive contribution to activity" is one of the major considerations of this book.

## CONCEPT OF ACCIDENT

An accident was defined in an earlier chapter as an unplanned event resulting in death, injury, or property damage. This definition leaves the decision of whether an unplanned event should be classified as an "accident" or as "a situation which might have caused an accident," dependent upon the definition of injury and property damage.

Death is readily definable. Injury and property damage, however, offer some unique problems. Is a slightly twisted ankle chargeable as an accident, or does it have to be sprained or broken? The same question can be raised about property damage. Obviously, injury and property damage can be arranged on a continuum—from insignificant injury or damage to near-death and catastrophic damage. For definition purposes some point on this continuum must be selected so that injury or damage above this point is considered significant and accountable as an accident.

The National Safety Council lists accidents which cover only injuries disabling beyond the day of the accident. The National Health Survey includes injuries causing people to restrict their usual activities for at least a day.<sup>1</sup> Many industrial insurance companies consider an injury chargeable when the injured misses one half or more days of work. In the area of property damages there has been less formalizing of figures. Many states require the reporting of automobile accidents when the damage exceeds a set figure, such as \$100. These variations in identification of an accountable accident explain the variance in accident statistics from agency to agency. A single system would help clarify this problem. The important point, however, is that the system of identifying accidents be presented with the statistics so the user can evaluate accurately the extent and nature of the problem the statistics describe.

Another concept which should be considered in a philosophical analysis of safety is the difference between an "accident" and "conditions leading to an accident." A nonswimmer may fall from a boat into deep water and be rescued by another person. This situation is not recorded as an accident but rather as an "occurrence which could lead to an accident." Removing the person who rescued the nonswimmer could easily change this example into one of "accidental drowning." Examples of this type are virtually inexhaustible. Actually, there are many of these "conditions leading to an accident" for every accident which occurs. An accident usually

<sup>1</sup> National Safety Council, *Accident Facts* (Chicago: The Council, 1962), p. 2.

requires the integration of a number of human errors or of one human error with normal activities. A person falling asleep behind the wheel may drift into the oncoming lane of traffic before awakening. This will lead to an accident only if a collision results.

Safety, then, is interested in eliminating human errors which can develop "conditions leading to an accident" as one phase of the accident prevention program. If successful in eliminating these conditions, accidents will be decreased or eliminated since it will no longer be possible to combine conditions into the single constellation of events which results in injury, death, or property damage.

### CONCEPT OF SAFETY

*"This is a safe road," "He is a safety-minded person," "That is an unsafe behavior pattern,"* are all comments which might occur during a discussion, especially one on accident prevention. Safety is a word used daily by most people. It describes one of the major problems facing society. One of the larger nonprofit organizations in the country, the National Safety Council, lists *safety* as its major objective. Yet, safety is a term which is difficult to define. In order to plan adequate safety programs and communicate concepts and ideas regarding accident prevention, an accurate definition must be developed and accepted.

As used in this volume, *safety* is a condition or state of being resulting from the modification of human behavior and/or designing of the physical environment to eliminate the possibility of hazards, thereby eliminating accidents. In reference to a *safe* person, this definition implies a person who has modified his behavior pattern to prevent accidents from occurring to himself or others. In the case of a *safe* road, it becomes one that has been planned to eliminate the possibility of human error, thereby preventing accidents from occurring.

This definition involves the two principle concepts which always emerge whenever safety is considered. First, human behavior must be considered—whether safety in relation to home appliances, roads, or educational programs is under study. Mechanical and transportation devices are designed and constructed to help eliminate the possibility of human error. Second, the prevention of accidents is the ultimate goal of all safety endeavors. Driver education has as its principle objective the changing of human behavior in a manner which will prevent the occurrence of traffic accidents. A well designed freeway or turnpike is not only built to

decrease travel time, but is designed and often justified on the basis of its ability to prevent accidents.

The problem of adjusting the physical environment to eliminate or decrease accidents is discussed in detail in Chapters 12 to 17. The modification of human behavior and the problems involved in this modification are the principle concern of Chapter 4 as it relates the role of human behavior to accident prevention.

## CONTRIBUTIONS TO SOCIETY

A critical review of the meaning of *philosophy* will assist in developing an understanding of the contributions the safety movement makes to all of society. The word *philosophy* is derived from the Greek words *philos* meaning *love of* or *loving*, and *sophia* meaning *knowledge*. *Philosophy then becomes the love of knowledge*. In its original and still primary value to society, philosophy requires a continual search for truth, an endless evaluation of the real and theoretical world in an effort to gain the facts and principles of reality, and an understanding of human nature and conduct.<sup>2</sup> Safety contributes to this search and development of knowledge. When the world of technology and machinery is analyzed, the potential and real hazards of this society are seen to involve every activity in which people engage. It is difficult to consider any activity, plan any program, or apply technological advances without a serious consideration for the safety of those involved. As more is learned about the behavior of people, as greater knowledge is gained regarding the relationship of people to all types of activities, the role of safety will continue to emerge as an important part of a person's daily routine.

This importance is continually developing through at least two avenues. The first is the general effort leading to the development of safety consciousness. Through the original efforts of many groups people are beginning to realize that accident prevention must be planned. Most organized groups have assigned safety responsibilities in the same manner in which industry designates a safety engineer and schools appoint a safety specialist. For example, many ski clubs and hunting groups have assigned accident prevention planning to one member or a committee of interested members. In this way the activities of the group can be evaluated to identify areas of potential accidents, and methods planned to

<sup>2</sup> Van Cleve Morris, *Philosophy and the American School* (Boston: Houghton, 1961), pp. 20-21.

eliminate or reduce the hazards involved. Through planned accident prevention of this type, groups are able to enjoy their recreational pursuits with a minimum fear of accidents.

The second avenue of development is through the growing awareness of the responsibility for providing for the safety of others. This responsibility is best observed in the protection a parent offers his family or in his concern for the welfare of a friend. A second and growing area has resulted from the responsibility each person must have for the members of society with whom he has contact. For the home owner this responsibility extends to everyone he invites onto his property. For the professional or supervisory person it extends to everyone he supervises or serves. This responsibility is continually being defined and expanded by the courts. In a liability suit the court requires a person to exercise normal prudence in safeguarding the people who come in contact with him or his property. Lack of consideration for hazards, or lack of a formal plan of accident prevention will usually make a person financially responsible for an accident involving his property or an activity for which he is responsible.

This natural and forced concern, coupled with the efforts of professional safety personnel, has resulted in a rising interest in accident prevention methods and a consideration of these methods in the planning of all activities.

### SAFETY OBJECTIVES IN MODERN SOCIETY

Philosophy is often expressed in terms of planned objectives. In the case of safety four objectives can be identified. These objectives express the contributions which safety can make in developing a society aware of the hazards of modern living and equipped to meet these hazards with accident prevention methods. These objectives are to:

1. Develop an awareness of the scope and nature of the accident problem.
2. Promote research and evaluation to gain greater understanding of the scope and nature of the problem, and develop methods of accident prevention.
3. Develop safe attitudes which will promote accident prevention in both old and new activities.
4. Integrate safety and accident prevention into the value structure and therefore into the personal philosophy of the general public.

DEVELOP AN AWARENESS OF THE SCOPE AND NATURE OF THE ACCIDENT PROBLEM. Before any solutions to the accident problem can be developed,

people must be made aware of the need for these solutions by understanding the extent of the accident problem; the direct danger to themselves, their relations, and friends; and the ways in which society is affected. This, the first objective, must be accomplished before the other objectives can be realized. The principle method of developing this understanding is through an organized program of education. This program should include formal instruction starting in the elementary school and continuing into college education. It also should involve informal but organized adult instruction. This can be accomplished through the public information outlets of radio, television, newspapers, journals, posters, and public forums, as described in Chapter 18.

**PROMOTE RESEARCH AND EVALUATION.** Organized programs of research are needed to collect the information necessary to develop proper accident prevention activities. In order to meet this objective, public and private support must be gained to finance and conduct the needed studies. The acquisition of new information and the evaluation of past concepts must be a continuous part of the accident prevention movement.

Evaluation of programs in operation is an important part of this objective. Every effort should be made to prevent the crystallization of programs into a convenient format without a continuous program of evaluation. The new concepts developed through research must replace less effective ones in operation. Every safety activity must be under continual scrutiny to make certain it continues to contribute to the basic objective—*the integration of safety into the philosophy of life of individual members of society.*

This program of research and evaluation must be sufficiently broad to encompass all phases of accident prevention. Continual research is needed in evaluation of the scope and nature of the accident problem, attitude development and modification, effectiveness of current programs, development of new safety programs, establishment of improved methods of public information, and evaluation and improvement of enforcement procedures.

**DEVELOP SAFE ATTITUDES.** The development of safe attitudes is associated directly with the development of an awareness of the accident problem. After people become aware of the nature of the problem they often are willing to accept responsibility for correcting it. This willingness, coupled with proper information, can develop a readiness to react toward hazardous conditions in a safe manner.

Safe attitudes are an important part of the accident prevention pro-

gram. Attitudes help control human activities and, in this way, determine whether a person will react to a particular set of circumstances in a safe manner. The development of sound attitudes and the modification of poor ones is the subject of Chapters 4 and 9. A thorough study of these chapters will assist in identifying the role of attitudes in safety and accident prevention.

**DEVELOP SAFETY INTO AN INDIVIDUAL PERSONAL PHILOSOPHY.** The final objective of safety is the integration of accident prevention values into each person's individual philosophy of life. In this respect, safety is a way of living. A positive relationship exists between the human characteristics of safety consciousness, religious convictions, social responsibility, and good citizenship.

The three previously listed objectives all lead to this one as the final and most important goal of safety programming. If, through information and education, people become aware of hazardous conditions and take the necessary preventive measures to avoid accidents, they will have begun to integrate safety into their personal philosophy. This development, in its ultimate form, will find people being truly concerned about the welfare of others and taking the time and effort to learn about accident prevention. This will lead to the integration of safety standards into present and future activities.

**INTEGRATION OF OBJECTIVES.** The four objectives considered in the preceding sections are closely related. Whenever the scope and nature of the accident problem are considered, suggestions and implications for improving the situation are logical consequences. If followed, these suggestions often will lead to the development of safe attitudes and integration of safety into the value structure. In all safety programs, evaluation must be a continual process. Thus, the four objectives are interrelated and jointly lead to the development of an accident-free society.

#### PROMOTING ORDER FOR SOCIETY

Safety contributes to the orderly conduct of society by working toward the elimination of accidents and unexpected occurrences. Whenever an activity such as the construction of a new building is beset by accidents, the orderly progress of the activity is either interrupted or the activity suspended. If accident prevention methods had been successfully employed, the accident would have been avoided and order maintained.

While the public, in general, has not become aware of the necessity

for an orderly progression of activities, industrial and business corporations have exhibited concern for the need for orderly progress and, hence, the elimination of the unexpected—the accident. Through guarding of machines, removal of litter, proper lighting and ventilation, and educational programs for employees, industry has continually decreased the number of accidents occurring during working hours. In recent years emphasis has also been placed on encouraging employees to practice safety during off-the-job hours. When an off-the-job accident occurs and an employee cannot report for work, the orderly operation of the plant is interrupted and the company suffers an indirect expense. This expense is noted in a number of ways—cost of hiring a replacement, decreased production, and failure to meet contract deadlines.

Society has not been able to see the direct and monetary values of organized accident prevention and has not exercised the same depth of programming and enforcement as industry has. However, within the framework of present accident prevention procedures, safety has contributed to the orderly progress of social development. Safety procedures and standards established for freeway construction and utilization, home construction, and development of recreation facilities have assisted in the advancement of society in these areas. Through the elimination or decrease in the number of accidents, the routine progression of an activity is preserved.

A second facet of *order for society* is the contribution of physical order for the development of a safe environment. Safety and good housekeeping are complementary. The orderly arrangement of material objects contributes to an accident-free environment.

### POSITIVE CHARACTERISTIC OF SAFETY

Safety must contribute to the activities of people in a positive manner. The consideration must be *safety for* an orderly society, *safety for* increased efficiency in daily activities, and *safety for* the promotion of physical and mental health of the nation. Safety must contribute to the positive fulfillment of an activity or adventure. In the introductory example in this chapter, the contribution of safety was described as making a major contribution to the successful launching of our astronauts. Additional examples can show the positive contributions toward comfort and freedom from worry in the home, enjoyment and relaxation during leisure activities, and a healthy and productive work environment.

The negative aspect, *safety from* injury and/or property damage should be discarded in favor of the positive approach. The "Safety First" slogan, so popular in education about 1920, is a negative concept. It suggests that safety is an end unto itself. This is an erroneous concept. Safety is a part of all active life and contributes to the quality and expression of this life. In developing this concept, Albert Wurts Whitney, a pioneer in the establishment of an organized program of safety, points out that:

Safety in reality is substitutional rather than negative. It removes a danger but only in order to make it possible to take on another. Life is intrinsically dangerous. Life is partly routine, to be sure, but more fundamentally it is an experience of the unknown and hence based on adventure. A life without adventure would be stale and unprofitable. Safety would have a poor place indeed in life if it eliminated adventure. It eliminates an adventure only to make place for another and better adventure and the new adventure is often more hazardous than the original one. The prime quality in safety, therefore, is not the removal of danger but an improvement in the quality of adventure.<sup>3</sup>

Society has accepted the positive approach in many of its social-psychological areas. For example, education is positive. Society *educates for* the continuance, development, and improvement of the social order. Education is not designed to be a *protection from* moral decay and destruction of the nation. The positive approach accounts for the negative aspect, but goes far beyond the simple protective characteristic of the negative. It accomplishes this by promoting improvement and advancement beyond the present conditions. Similar examples of the positive approach can be shown for the public health and welfare programs, the concepts of freedom and democracy, and the role of religious values in society. Each of these could be approached from the negative rather than the positive side. In order to reach the ultimate objective of each of these areas, the improvement and betterment of individuals within society, the *positive* must be the principle pattern of development. Safety then, is not unique in the positive approach. It is joined and complemented by the other social forces lending order and direction to society.

The negative or *safety from* concept is only used with the very young who are unable to understand the logic behind correct and safe procedures. The transition from the negative to positive passes through three

<sup>3</sup> Herbert J. Stack (ed.), *Safety for Greater Adventures—The Contributions of Albert Wurts Whitney* (New York: Center for Safety Education, New York University, 1953), pp. 46-47.

distinct phases. First, the *negative* or *do not* concept must be used with the young child. The child must be told what he can or cannot do in relation to the danger involved. This stage gradually gives way to understanding the logic behind safe behavior. This stage is one of self-preservation. Safety procedures are followed because violation of them will result in injury. The junior high school student follows the safe procedure for using industrial arts tools and equipment because he has been taught that the wrong way will result in personal injury. As the student matures the transition to the positive approach is completed. The teen-ager is able to understand the contributions of safety to all activities, and practices safe procedures as a contributory part of these activities.

A parallel aspect of the positive characteristic of safety is the relationship between *the right way* and *the safe way*. In essence, the safe way is always the correct way. Therefore, education in proper procedures is always safety education. It isn't necessary to label a method as being the "safe way." Since safety is a positive contribution to all activities, safety must be inherent in determining the best way to perform any activity. For example, a football coach does not say "I will now teach you to tackle safely." He teaches the correct way which incorporates safe procedures. It is not, however, safe tackling for the sake of safe tackling. The players tackle safely in practice so that they can later enjoy the adventure of this competitive sport under game conditions.

### DEVELOPING THE SAFETY CONCEPT

The responsibility for developing the safety concept and leading society to the fulfillment of the objectives of safety requires the co-operation and efforts of safety specialists, educators, and other members of society. Accidents will continue to occur. The best efforts of man can only lead to a reduction in bodily injury, death, and property damage. However, the fact that much more should and can be done has been demonstrated by the reduction of industrial accidents and deaths. This reduction has, over the past half-century, grown to 50 per cent despite a continued increase in the number of industrial employees. This decrease can be credited to the organized attack on industrial accidents by industrialists, safety specialists, and insurance personnel. Even with this reduction further improvement is possible.

The National Safety Council has predicted that the universal acceptance and use of automotive seat belts would decrease traffic fatalities by

5,000 and reduce serious injuries by one third.<sup>4</sup> This example, plus the reduction cited in industrial accidents, supports the need for developing and improving accident prevention procedures throughout the country. It has been shown that accidents can be drastically reduced through an organized program of safety. The reduction of accidental deaths through the use of seat belts is only one of many known procedures for reducing death and injury. The problem remains one of presenting this information to the public and making it sufficiently concerned to take action. Safety specialists and educators can identify the need and provide information on action which should be taken. The people, however, must act in order to reduce accidents. It is the responsibility of education and public information personnel to develop educational programs which will encourage people to confront their everyday activities with safety integrated into their philosophy of life.

## EDUCATION

Education has been consistently viewed as the method of safety promotion which will lead to the ultimate degree of accident prevention. Education often precedes other methods since people must be aware of a need before they will authorize engineers and enforcement personnel to act. In addition, education has the responsibility of informing the public of new equipment or enforcement procedures. In order to accomplish these objectives, education has been divided into two basic facets—formal classroom instruction, and informal community programs and public announcements.

Formal classroom instruction has the greatest responsibility for the education of elementary and high school students. Virtually all students receive integrated safety instruction in the elementary school. In addition, many high school students receive complete courses in driver education. Many of these students also receive a formal course in general safety and accident prevention. Beyond high school, formal safety instruction reaches only a small minority of the people. Teachers and groups specially concerned about safety become the only ones receiving special safety instructions. In the community only a few formal instructional programs have been successful. While programs of formal instruction fill a valuable need for children, they have not been able to meet the needs of the adult population.

Informal community programs have been designed and planned to

<sup>4</sup> National Safety Council, *op. cit.*, p. 57.

reach the public. These programs disseminate safety information, detail the extent of the safety problem, and encourage people to act in a safe manner. Since people are often reluctant to attend safety meetings or take an active part in safety activities, the program must be planned to bring the concepts to the individual. This is usually accomplished through the mass media sources. In addition, special handouts, billboards, and bulletin boards can be used to distribute information.

#### LOCAL RESPONSIBILITY

The development and implementation of safety programs are the responsibility of the local community. Planning and development can often be done on a national, state, or area basis. The actual program must, however, be implemented by people in the community. If leadership does not exist at the local level, all educational programs except simple public information announcements will be poorly developed, if at all. In order to have an effective safety program, the community leaders must take an active part in the program.

Community leaders are in a position to determine which programs are most effective and the best time to start them. In addition, they can supply or recruit personnel to modify and conduct the various activities. If the leadership group of the community will take an active role in safety, it will be able to present the program in a manner which will be acceptable to a majority of the people.

#### SUMMARY—SAFETY IN A CHANGING WORLD

Safety is often thought of as a restrictive force in society: a force designed to restrain the adventuresome and curb the aggressive. This is far from true—in fact it is the converse of the actual philosophy of the role of safety in society. Many inventions and many new activities would have been doomed to failure if principles of accident prevention had not been carefully integrated into the activity to help make the first attempt successful. Imagine what would have happened if the United States had not integrated safety into every phase of the space flight program. If the first space flights by man had ended in failure, the program would have been set back many years. The fact that they were successful has assisted in progress at an accelerated rate. Good safety procedures have contributed to making rapid progress possible.

Safety has and will continue to lend order to activities, serve as a

positive factor in the planning of activities, and contribute to progress by helping assure the success of scientific or exploratory adventures. Safety has had its greatest effect on those people who are leading society to new and greater adventures. People involved in atomic research and development, in space research, and in automotive, aircraft, and other forms of transportation development are well aware of the hazards that might exist if they did not put accident prevention techniques into operation. Certainly, human error exists even in these areas and accidents do happen. However, the key to success in the future is partially dependent on how successful teachers, safety specialists and interested community leaders are in developing in all people the proper attitudes and helping them build safety into their personal philosophies of life. Failure in safety will mean failure for future research and development. Success in safety will permit and promote the discovery and development of adventures which are beyond our present imagination.

## ACTIVITIES

1. Identify programs a local community might plan which will contribute to the integration of safety into the philosophy of life of community members.
2. Review the literature and identify the many ways in which education, enforcement, and engineering are working toward the development of a sound program of traffic safety. Of home safety. Of industrial safety. Of recreational safety.
3. Plan a "brainstorming session" for the class and discuss the ways in which the *positive approach* toward safety contributes to the improvement of the social order.
4. Identify attributes which could describe a member of society who has integrated safety into his personal philosophy of life.

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# Psychological Factors Related to Safe Human Behavior

THE BEHAVIOR of human beings must be considered whenever accident prevention plans are formulated. Chapter 1 stated that 85 per cent of all accidents are caused by unsafe behavior—the subject of this chapter. Human behavior enters into each of the three phases of safety—education, enforcement, and engineering. When considering each of these areas the reactions of people to circumstances, environmental conditions, material changes, and human interaction must be evaluated before accident prevention plans can be formulated with expectation for a reasonable amount of success. For example, fatigue, highway hypnosis, and monotony are all variables in engineering which must be considered in the planning and construction of new roads. The numerous improvised uses of household appliances and repair activities of the homeowner often require manufacturers to build sealed units or design safety features to prevent unsafe use or repairs resulting in an appliance below minimum safety standards.

Enforcement procedures are designed to encourage violators to change behavior patterns and show more respect for laws planned for the protection of all. In some cases the traffic officer is even given the choice of issuing a written warning or citation. In nearly all cases the judge has the authority to either dismiss the case or set what he considers to be a reasonable penalty. The decision of dismissal, warning, or penalty is based upon whatever procedure will best help the offender avoid and guard against additional traffic errors. In situations where traffic officers have a choice

of issuing warning notices or citations, mature and well-trained personnel are a necessity. They become, in essence, the first person passing judgment on the severity of the violation and the extent of the penalty. If the person is issued a written warning, he is released without further action. If, on the other hand, he is given a citation, he can plead his case to the traffic judge.

Education for accident prevention is involved with psychological variables in two respects. First, by definition, safety involves the behavior pattern of the individual—primarily through personality considerations. As a result, safety programs must be designed to develop desirable behavior patterns or change undesirable ones. Second, all of education, including methodology, is directly involved with the behavior patterns of people. Education is, in essence, the application of many of the principles of social psychology.

### ATTITUDE FORMATION AND MODIFICATION

Whenever the behavior patterns of people are studied, the structure which controls this behavior must be thoroughly investigated. Behavior, in relation to accident prevention, is dependent upon the attitudes and values which help determine the nature of responses and activities. Since situations involving a choice of safe or unsafe behavior are always present, people automatically develop attitudes to help guide and determine the nature of their responses. These attitudes are *inferred* human characteristics based on observation of human behavior. That is, attitudes are never seen; their existence is proven and identified by observing the behavior of people.

#### ATTITUDES DEFINED

An attitude is *a predisposition to perform, perceive, think, and feel toward something or some object in the environment*<sup>1</sup>—or *an enduring organization of motivational, emotional, perceptual and cognitive process, with respect to some aspect of the individual's world*.<sup>2</sup> In analyzing these definitions, a number of important factors emerge:

1. An attitude is *not an act* but a readiness to react to a situation as soon

<sup>1</sup> Theodore M. Newcomb, *Social Psychology* (New York: Dryden, 1950), pp. 118-119.

<sup>2</sup> David Krech and Richard S. Crutchfield, *Theory and Problems of Social Psychology* (New York: McGraw, 1948), p. 152.

as it develops. The individual does not have to analyze and think. The reaction is determined by the attitude and takes form in response to the stimulus.

2. An attitude is *enduring*, that is, it tends to perpetuate itself. Attitudes are persistent and not easily changed or modified. Once developed, they tend to persist and control actions in a well-defined pattern.
3. An attitude is *directed toward some object or situation in the environment*. An attitude requires an object for its action. The response must be directed at a situation, person, condition, or the like.

When safety was defined as a function of human behavior, the importance of controlling this behavior through the development and modification of attitudes became important. When a new situation develops, a person with the *desirable safe attitude* will react in a manner which will avoid or decrease the possibility of an accident. A readiness or predisposition to react safely will have controlled and directed the reaction. For example, a person's attitude toward driving will control the way in which he reacts to varied driving situations. Provided with the condition of following a slow car in light traffic and hilly terrain, a driver may chance passing on a hill or curve, or patiently wait until a section of road is reached which permits safe passing. His behavior will be controlled by his attitude toward safe driving. In this example the person's attitude toward safety was identified as the principal control of his behavior pattern. It helped determine whether he should wait until a safe passing situation developed, or whether he should accept conditions which might result in an accident. A single attitude is rarely the only intervening condition which determines behavior. Such factors as motivation, in this case the reason for passing the slow vehicle, may be an important consideration. The driver might be late to a job interview, or taking a seriously ill family member to the hospital. The value placed on these factors may be sufficient to overcome a safe attitude and cause a normally safe driver to act in a dangerous manner.

The role of attitudes in behavior is very complex. The *simple example* rarely exists. Rather, each situation brings together many conflicting as well as supporting attitudes and values which interact and determine the behavior response.

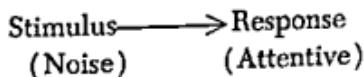
Accident prevention programs are normally designed to develop or modify attitudes into socially acceptable patterns. As a result, the term *socially acceptable attitude has been developed to identify attitudes which are in the best interest of society*. Safety education has the responsibility

of developing socially acceptable attitudes and modifying or changing unacceptable ones. When successful, these attitudes will offset other factors which lead to unsafe behavior patterns, and develops a person able to react to most situations in a safe manner.

### ATTITUDE FORMATION

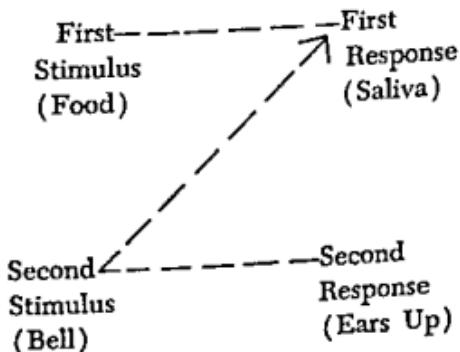
In analyzing the formation of attitudes, this fundamental concept of behavior must be considered: *For every stimulus there is a response*. Accepting this as a basic precept, it follows that one does not respond unless he is stimulated. The development of this pattern involves behavior at two levels.

#### 1. Primary-reaction system.



In this situation, the person is considered to be in an untrained natural state. Under these conditions, it is easy to predict the most profitable reaction to a given situation—as illustrated by the example: Noise solicits a response of attentiveness. This condition, however, exists only in simple examples and early in life and is soon complicated by myriad of experiences, structural abnormalities, injuries, and other physical and mental conditions.

#### 2. Secondary-reaction system. This level of development is more complex and involves the concept of conditioned response. The traditional demonstration of this phenomenon was developed by Pavlov, the Russian physiologist, who used a dog's reaction to food and noise.

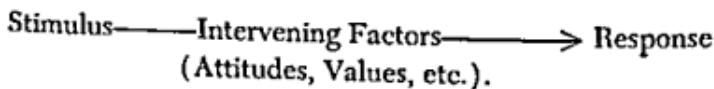


The presence of food caused saliva formation in the dog—a primary reaction. At the same time a bell was rung which solicited a second

primary reaction—ears up for listening. Finally, it became possible to solicit the first response (saliva) by just ringing a bell. This is a *conditioned response* and represents the secondary-reaction system.

While these represent the simple ways in which behavior patterns develop, few patterns in which we are involved are as simple as these examples. Even in early childhood, intervening variables enter this development procedure which make prediction of the stimulus→ response procedure difficult. Also, unless the conditioning procedure is known, it is not possible to predict the response of the secondary-reaction system.

The intervening factors develop and alter the pattern of behavior within the relatively simple framework of this stimulus→ response system. These include personality factors such as attitudes, values, and emotions as well as past experiences, physical abilities, and physical shortcomings. Virtually all behavior patterns involve these intervening factors. For the purpose of this treatise, the principal concern is the role of attitudes as an intervening factor. Later in this chapter other variables important in the development of safe behavior patterns will be discussed.



Attitudes exist as intervening factors between the stimulus and response, as illustrated in the above diagram. When a situation develops in which a person has had previous experience, this experience will help determine and direct the response. When the experiences are repeated, the person can develop a readiness to respond to the stimulus in a particular manner. This readiness to respond is the attitude. For example, the teen-ager who has a desire (or need) to impress his girl friend with his ability and courage may use driving prowess as his medium. This might involve skillful driving of his speeding car or passing without proper visibility. This pattern of behavior will develop a readiness to respond to numerous driving situations or to driving *per se* in an unsafe manner. Since careless or reckless driving is socially unacceptable, an unacceptable safety attitude is in the process of being developed.

Attitude formation toward safety, as well as toward most common objects or situations in our society, normally starts early in life. This includes attitudes toward driving, even though actual experiences do not begin until ages 15 to 18. Comments such as, "Let's be first," "Drive faster," "Pass that car," are often heard from young backseat observers. Children's games involving wheel toys reflect the driving patterns of parents. Ele-

mentary school units in crossing streets, riding bicycles, and playing around the home involve considerable instruction which starts the early development of attitudes. These early patterns may lead to the formation of socially acceptable attitudes—as encouraged by the elementary school program. Or, they may produce socially unacceptable attitudes which must later be overcome by the driver education program. Recently a high school girl had her driver's license revoked due to excessive violations. When confronted by her high school driver education teacher, she explained that "no one was available to watch out the rear window for the police." This girl had been taught by her mother to sit in the back seat and sound the alarm whenever a police car was observed through the rear window. When the girl obtained her driver's license, she had already developed a driving pattern, which included speeding, from these previous experiences. As a result, when the girl drove—and sped—she was apprehended by the police. Instead of accepting the violation and stopping her speeding, she continued to speed and blamed the citations and eventual loss of her license on the lack of a rear-seat lookout. In this example, the driver education teacher was unable to overcome the years of training which developed the poor attitude. This problem of changing or modifying driving attitudes which developed prior to the driver education program is one continually faced by the teacher. In some cases the student conforms to the pattern established by the teacher, but later returns to the unacceptable pattern learned prior to driver education. Fortunately, the driver education teacher often is assisted by socially acceptable patterns developed by parents making a conscious effort to drive safely.

This example tends to emphasize the point that attitudes toward driving as well as other facets of safety start developing early in life. In many cases, such as crossing streets or avoiding hot pans on the stove, early learning is essential to avoid serious accidents. In others, such as driving or competitive sports, early learning sets the pattern, and safety programs presented in elementary and secondary schools must be designed to correct socially unacceptable attitudes and reinforce acceptable ones.

#### ATTITUDE MODIFICATION

Since attitudes are learned predispositions to behave in a particular manner, modification and change of socially unacceptable attitudes must be planned to offset this readiness for action. Attitudes involve the emotional characteristics of the individual. This can be illustrated by an

analysis of a typical teen-age driver who has a socially unacceptable attitude. He will agree that traffic laws are essential to maintain order and prevent accidents. At the same time he will indicate that many of the laws should be discontinued or should apply only to old or slow drivers. He visualizes himself as an expert driver, completely in control of the car and the situations his driving creates. When he intentionally violates the law, he believes he has complete control of the situation. Any attempt to tell or show him that his actions are endangering his own life as well as the lives of others becomes a direct attack on his personal beliefs, judgment, and evaluation of himself. These factors are part of his emotional make-up, and changing his action pattern requires changing some of his personal beliefs, judgments, and self-evaluations.

Since most attitudes have been developing for many years, they often involve complex personality traits such as introvert or extrovert behavior, ego, and self-expression. An attempt to change or modify the attitude often is interpreted as an attack or attempt to discredit the beliefs and behavior of the individual.

Because of their deep-seated roots, changing or modifying socially unacceptable attitudes is a very difficult and challenging task. Success is dependent upon the choice of methods and the receptive frame of mind of the individual. While change is difficult to accomplish, it is not impossible. The longer the attitude has persisted, the more difficult it is to change. Hence, organized safety programs should be presented as soon as formal education begins in kindergarten. They should continue throughout formal education in special classes, such as driver education; and integrated safety lessons, such as exist in industrial arts, physical and health education, and science. In addition, parents should be conscious of the lasting effect of preschool safety training. Chapter 9, devoted to methods of instruction in safety education, will investigate the procedures for modifying and changing attitudes.

### HABITS AND VALUES

Besides attitudes, two other levels of behavior control are important when considering the problems of safe human behavior. *Habits are the automatic responses to certain stimuli, such as applying the brakes when a traffic signal turns red. Values involve the beliefs and opinions of the individual or group as he perceives various situations in society.*

## HABITS

Many of the routine actions of people become automatic and exist without direct involvement of the conscious thought process of the individual. These automatic responses to stimuli—habits—are necessary and important functions of daily life. The way people use eating utensils, wash, dress, and work are examples of habits which add order and organized routine to daily life.

Many actions involving safety become habits. These habits are formed through direct and repetitious experience. After an action or procedure, such as shifting a car, has been repeated many times, the conscious thought process is bypassed and the stimulus of moving the car solicits the shifting response.

Habits and attitudes differ in both the level of behavior control and the process of control. An attitude is not action, but a readiness for action. It involves conscious thought and the resulting action may vary, depending on the nature and condition of the stimulus. Finally, an attitude may be developed by vicarious rather than direct experience, and may, under certain conditions, result from a single experience.

Such acts as stopping for a red traffic signal, signalling when making a turn, and checking for a clear road before passing, are habits which add order and safety to the driving pattern. In general, most driving habits tend to promote safety and are, therefore, socially acceptable. However, some people commit driving errors often enough to develop a particular error into a socially unacceptable habit. For example, many people tend to drive at 30-35 miles per hour under normal city driving conditions. These people will automatically drive at this speed unless they make a conscious effort to drive at a slower speed. They have, as a result, developed a habit of driving at a rate of 5 to 10 miles per hour over the legal speed limit. While in some situations this habit is not dangerous due to good driving conditions, this same speed may result in a serious accident when driving conditions require a slower speed.

The development of safe habits is automatic, provided the response pattern is continued and reinforced. The development of safe habits is promoted by socially acceptable safety attitudes. Like attitudes, habits are difficult to change or modify. Since they are *automatic* responses to stimuli, conscious thought is not involved. As a result, the bad habit must be changed by making the person aware of his action and working to remove

the habit from the automatic response category. For example, the habitual speeder must first become aware of his fault, realize and desire the need for change, and then discipline himself to check and correct his speed. One of the keys to changing the undesirable habit is to work through the attitude structure of the individual. Once the attitude is modified, the unacceptable habit will soon be replaced by a socially acceptable one.

## VALUES

*Values are the enduring principles upon which a person builds his life.* When compared with habits and attitudes, they take their place at the highest level of behavior control. That is, they are more encompassing than either habits or attitudes, and, when a conflict occurs, the individual's value structure will overcome well-established attitudes and habits in order to preserve the prevailing value. Values are the result of continued development and usually take rigid form as a person matures. Safety is not a value within itself but does enter into the individual's value structure in numerous ways.

Values toward family, friends, and the nation are important when considering safety. A person's value toward the preservation of his family and friends includes concern for their safety. In fact, the famous safety slogan, "*The life you save may be your own,*" cannot compare in content with the *desire of a person to save the lives of those he loves.* Unfortunately, this latter concept has not been integrated into an appealing slogan. However, a person is more likely to risk his own life in a dangerous and/or foolish act than he is to involve the life of a family member or friend. As a result, the value structure of an individual is important when considering the development of a socially acceptable pattern of safe behavior. This is supported by the fact that statistics show a marked decrease in automobile accidents and violations as a man takes on the added responsibilities of marriage and family. Credit for this improvement in driving records is usually given to the maturation of the individual and his new responsibility to protect and provide for his family. The preservation of family has entered his value structure.

Little has been done to work through the value structure of people to improve their safety attitudes. However, when a positive relationship between values and safety does occur (as illustrated above), the results usually improve the safety consciousness of the individual.

## IMPLICATIONS FOR EDUCATION

Since one of the principal objectives of accident prevention and safety programming is the modification of human behavior to eliminate the possibility of accidents, the educational efforts of school and society must be carefully planned and developed. The fact that safe human behavior is *primarily a variable of the attitude structure of the individual* has numerous implications for education. The most important implication is the necessity to adjust and plan safety programs which change, modify, or build socially acceptable attitudes.

Traditional education programs which simply involve the presentation of factual information to be memorized or studied for understanding and application are not adequate for safety education. Actually, much of the structure of safety education courses and adult programs involves the presentation of factual information. However, the changing of a person's *readiness to react toward a situation* involves working with his personality and emotional characteristics in addition to providing the necessary factual information. Studies have shown that the adjustment and development of attitudes is one of the most difficult challenges of education and must involve the utilization of the best of modern teaching methods. Student involvement coupled with group pressures, as later described in Chapter 9, seem to provide the greatest promise for the modification of human behavior within the limitations of our present educational system.

The greatest difficulty of safety education is the inability to identify attitude change. This is true, especially on a mass production basis typical of educational programs. A science course designed to teach fundamental scientific principles is easily evaluated through any of the numerous testing devices designed to evaluate both understanding and recall of subject matter. On the other hand, a program designed to change or improve attitudes does not have tests available which have the same validity and/or reliability as subject matter tests. As a result, safety education testing often becomes a simple evaluation of understanding and recall, instead of the changes which have taken place in the personality characteristics which control behavior. While evaluation methods for attitude development and other personality characteristics are being improved, they are presently either too time-consuming, designed for one person at a time, or require a trained psychologist to administer, evaluate, and interpret.

This evaluation problem has created a prestige problem for safety education. Uninformed critics view programs such as "Family Relations" and "Safety Education" as unnecessary additions to the school curriculum since they do not provide traditional content and cannot use traditional testing devices to show fulfillment of stated objectives. Yet, these programs should be among the most important in the school, for they guide people into socially acceptable patterns of behavior. These behavior patterns are often prerequisites for successful contributions to our society since they protect the individual from accidents and help him adjust to accepted social patterns.

This difficulty in the evaluation of the success of these programs should be accepted as a challenge and the best efforts of psychologists, sociologists, and educators directed toward the development of improved evaluation techniques and methods.

### HUMAN ERRORS AS ACCIDENT CAUSES

Human errors are the principal cause of accidents, as described in Chapter 1. Many of the accidents attributed to chance, fate, or mechanical failure can be traced to some aspect of human error. It is characteristic of people to look for an excuse rather than a cause. An automobile accident resulting from brake failure is often attributed to mechanical failure or fate. However, this defect as well as many others often provides warning in the form of leaks, decreasing pedal, and so on. The proper checking of mechanisms, following planned safety procedures, and cautious use can eliminate many of the accidents classified as fate or chance. However, many people ignore safety until after an accident has occurred. This lack of action is, within itself, a human error. *Whenever an accident could have been avoided through a planned safety program or procedure, the cause of the accident can be attributed, at least in part, to human error.*

In evaluating the cause of an accident, all errors which led to the accident must be studied in order to plan necessary programs to prevent similar accidents. For example, an automobile crosses the center line into the path of oncoming traffic—the result is a head-on collision. In evaluating the accident, any of the following conditions might have contributed to the accident:

1. Falling asleep behind the wheel—unsafe behavior.
2. Losing control because of excessive speed—unsafe behavior.
3. Intoxication—unsafe behavior.

4. Faulty steering—unsafe environment.
5. Faulty brakes—unsafe environment.
6. Faulty wheel bearing—unsafe environment.

The cause may result from multiple conditions; that is, an intoxicated driver may lose control because of excessive speed and a faulty steering gear. In addition, the role of the other driver must be considered—whether he could have maneuvered or taken other action to avoid the accident. Once the specific conditions leading to an accident have been ascertained, human behavior must be considered in determining preventative action for future situations. Such questions must be raised as: Why weren't mechanical devices checked periodically? When was the first warning of failure received? Why was the driver speeding, intoxicated, driving recklessly, or tired? The answer to these questions will identify the basic cause of the accident and lead to a preventive program designed to avoid similar accidents. In order to study these questions, personality characteristics and behavior patterns must be thoroughly evaluated.

The key to accident prevention lies in understanding behavior patterns and the factors controlling and determining these patterns. Understanding the role of habits, attitudes, and values will help determine the basic causes of accidents. In addition, emotions play an important role in modifying and changing normal patterns of behavior.

## EMOTIONS AND HUMAN BEHAVIOR

Emotional behavior based on feelings of fear, hate, love, and the like, play an important role when evaluating the cause of accidents. Emotion may be defined as "*a disturbed psychological condition, which can best be described as a disintegrative activity.*"<sup>3</sup> As a result, activity which is affected or controlled by emotions is the most disorganized form of behavior. Because of this disorganized condition, behavior may be illogical and unpredictable. This explains why, under certain conditions, normally safe individuals act in a reckless manner. For example, a person who has just been fired, or cheated, or had a severe argument with his wife, may act erratically, take unnecessary chances, and drive in a manner completely different from his normal driving pattern. Given the same set of driving conditions—going to work in the morning, leaving at 7:30 a.m., traffic moderate—a person will exhibit different patterns of driving.

<sup>3</sup> Douglas Fryer and Edwin R. Henry, *An Outline of General Psychology* (New York: Barnes & Noble, 1937), p. 117.

dependent upon how he "feels." This feeling is controlled by both physical and emotional factors.

Research studies have shown that emotional patterns of behavior play an important role in accident causation. While people with such physical characteristics as slow reaction time, tunnel vision, color blindness, and the like, have rarely been found to have more accidents than those not having these shortcomings, people strongly affected by emotions, or having major personality problems, have been identified with accidents. In a comparison study of 16 to 19-year-old traffic violators and nonviolators, Beamish and Malfetti point out that "members of the violator group rated (significantly) lower in emotional stability, conformity, objectivity and mood."<sup>4</sup>

An important consideration is the behavioral changes which take place when a person becomes angry or shows other emotional extremes. Under these conditions, his behavior is disorganized, and he often loses control of the situation and does things he normally would not do (speed, swim in treacherous water, drive while intoxicated). Thus, studies which have shown a relationship between accidents and emotions, generally have shown that the person easily overcome by emotions is the one most often involved in accidents. This concept is especially true when a person becomes excited or frightened or expresses other forms of emotional reactions which tend to overshadow the normal reaction pattern. Under these situations any prevailing safety attitudes may be overshadowed, and the person may react in an unsafe manner, he would not consider under normal conditions. Since this emotional pattern is an integral part of a person's personality, it is difficult to change or modify. In promoting accident prevention, safety attitudes must be strengthened to the point where they cannot be overcome by the emotional behavior of the individual.

Emotions also play an important role in the discussion of attitude change or modification. As previously mentioned, the changing of attitudes is extremely difficult. Part of this difficulty results from the degree of permanence given to attitudes by emotional involvement. For example, a socially unacceptable attitude toward water safety may be expressed in the form of reckless boating, disregard for weather warning signs, and irresponsible behavior. At the same time, the person exercising such behavior probably is not cognizant of this behavior and considers himself an

<sup>4</sup> Jerome J. Beamish and James L. Malfetti, "A Psychological Comparison of Violator and Non-Violator Automobile Drivers in the 16 to 19 Year Age Group," *Traffic Safety, Research Review*, Mar. 1962, p. 13.

excellent boatman, in complete control of the situation at all times. Efforts to change this pattern of behavior imply that he has made mistakes of judgment and action and are, as a result, an attack on his ego. The result of these efforts could be emotional expressions in the form of anger and resentment, possibly followed by continued display of reckless behavior. If this occurs, a new method of changing the socially unacceptable attitude must be devised.

### THE ACCIDENT REPEATER

*The term, accident repeater, describes a person who has had more than one accident of a particular type of classification.* He may have this label due to statistical chance; that is, by chance alone a person may have more than his share of accidents. Or he may have greater exposure. A cross-country salesman driving 100,000 miles or more per year has greater exposure and may, therefore, have more accidents than the average person who drives about 10,000 miles per year.

In research studies, the accident repeater is often the one under study. People who have had a number of accidents of a particular type may be studied to determine accident causes and methods of accident prevention. As a result, accident repeaters often are identified in accident files and their records utilized in research studies.

### THE ACCIDENT-PRONE

People have studied and attempted to identify the characteristics which separate individuals who have accidents from those who do not. These attempts have been motivated by the great need for accident prevention and the possibility of identifying the group who could profit most from the efforts of safety education. Within these activities, research personnel have attempted to isolate and identify the group of people most susceptible to accidents. This group has been identified as being *accident-prone*.

The theories about accident-proneness have been numerous, varied, and often contradictory. For this discussion, being accident-prone should be considered as a condition of susceptibility to behavior patterns that may lead to accident involvement under proper environmental conditions. Or, briefly, the tendency to manifest accident-producing behavior.<sup>5</sup>

<sup>5</sup> R. C. S. Rommel, "Personality Characteristics and Attitudes of Youthful Accident-Repeating Drivers," *Traffic Safety, Research Review*, Mar. 1959, p. 14.

This section therefore will include a discussion of the development of the concept of accident-proneness, the significance of physical and personality characteristics, and a theory based upon the relationship of being accident-prone and self-destructive.

#### EMERGENCE OF A CONCEPT

Early development of the concept of accident-proneness can be traced to Europe where considerable research was conducted to identify people who might be classified in this manner. The earliest recorded study establishing this was published in 1919 in England, by M. Greenwood and H. M. Woods, investigators for the British Industrial Health Research Board. They developed the concept that multiple accidents are a result of personality and not determined by obvious extrinsic factors.<sup>6</sup> In 1926, a German named Marbe pointed out that a person with one accident is more likely to have another than the person who has never had any. Adler, in 1934, came to the same conclusion in Vienna. Marbe suggested that some factors in the human personality are responsible for the curious repetition of injuries of *those prone to accidents*.<sup>7</sup> Most of these early research studies tended to identify as being accident-prone a group of people having more accidents than they should have when considering the laws of chance occurrence.

Three concepts have evolved since the early discovery that some people seem more susceptible to accidents than others. These concepts or theories could be classified as The Multiple-Accident Concept, The Variable-Group Concept, and The Universal-Susceptibility Concept.

**THE MULTIPLE-ACCIDENT CONCEPT.** *This theory implied that accident repeaters were prone to accidents.* It divided people into two groups, accident free and accident repeater, with the latter group being referred to as accident-prone. The theory was later refined to consider exposure. A person having high exposure to a certain type of accident was not considered accident-prone unless his accidents occurred more frequently than people with the same exposure.

This theory was supported by the early discovery that over a specified period of time 20 per cent of the people have 80 per cent of the accidents.<sup>8</sup> These 20 per cent are identified as being accident-prone. However, subse-

<sup>6</sup> Normal R. Lykes, *A Psychological Approach to Accidents* (New York: Vantage, 1954), p. 10.

<sup>7</sup> Thomas Gorman, "Accident Proneness," *Today's Health*, Dec. 1954, pp. 32-33.

<sup>8</sup> Norman R. Lykes, *op. cit.*, p. 11.

quent investigation revealed that, over a second period of time with the same original group, a different accident group would be identified. Some members would remain. A large number, however, would be replaced by new people. Part of this shift would be the result of chance distribution. The remainder would represent a change within the accident group. As a result, the early concept of accident-proneness had to be revised to show that accident-prone characteristics are fluctuating and cannot be consistently identified within a certain group. Thorndike, in 1951, summarized the inadequacies of this theory by pointing out that "accident proneness, if it exists, is a very complex matter and the factors which make a person susceptible to accidents may differ from person to person. There does not seem to be any simple shortcut to identify the accident prone."<sup>9</sup>

**THE VARIABLE-GROUP CONCEPT.** When fallacies of the original concept became apparent, a gradual revision was undertaken until a new theory emerged. *This theory was based on the belief that accident-proneness was a variable characteristic in people. Depending on conditions of emotional stability and environment, an individual could fluctuate in and out of the accident-prone group.* It further emphasized that a person may be accident-prone at one time and not another.

This theory has been challenged on one basic point. It implies that accident-proneness is a trait that comes and goes. By definition, accident-proneness has been identified as *a condition of susceptibility to a particular type of response.* This relates accident-proneness and attitudes. As a result, the concept of accident-proneness includes many of the characteristics of attitudes. Accident-proneness is a consistently recurring phenomenon and does not come and go like a physical pain. This characteristic leads to further revision of the concept of accident-proneness, the emergence of the theory of Universal-Susceptibility.

**THE UNIVERSAL-SUSCEPTIBILITY CONCEPT.** According to this theory, nearly everyone taking an active part in life and being exposed to hazardous conditions develops positive responses for these conditions. At the same time, a variable threshold of resistance to accident-producing behavior, similar to the threshold of resistance to expression of extreme emotions, is developed. Under normal conditions a person will respond in a positive (safe) manner when the hazard arises. However, when circumstances vary, a person's behavior will be modified by the new conditions.

<sup>9</sup> Robert L. Thorndike, *The Human Factor in Accidents with Special Reference to Aircraft Accidents* (Washington: U.S. Department of Health, Education and Welfare, 1961 reprint), p. 147.

This behavior change may be in the direction of *added caution* or it may be in the opposite direction—making the person more susceptible to accident-producing behavior responses. If, while susceptible, the proper set of environmental conditions exist, an accident is the inevitable result. Graphically, this concept may be presented as follows:

$$\text{Unsafe Behavior} + \text{Environmental Conditions} = \text{Accidents}$$

The theory of universal-susceptibility, that is, *all persons have a tendency towards accident proneness*, can be illustrated by a series of examples.

#### SITUATION

1. A person with relatively good swimming ability is engaging in diving and recreational swimming. He swims well within his ability range.
2. Another swimmer nearly drowns. The swimmer in the above situation witnesses the accident.
3. This same swimmer is engaged in recreational swimming with a group of excellent swimmers who continually swim further out into deep water than he does. He is dared and/or encouraged to show that he can swim as well.
4. The same swimmer is in a boat which capsizes. He does not have any life-saving training, but panics and goes to the rescue of a drowning friend.

#### PATTERN OF BEHAVIOR

Normal pattern of behavior—safe response.

Added caution exerted after viewing near drowning. Safe response—with added caution—above normal pattern of safe behavior.

Beginning of unsafe behavior pattern. Takes risks he normally would not take. With added conditions, such as a heavy swell, an accidental drowning could occur.

Unsafe behavior—panic condition. Risks drowning. Nearly all conditions for an accident are present. The person is unable to act safely due to his state of near-panic.

Similar examples could be cited in traffic, industrial, or home safety. This example shows that safe behavior is a variable, adjusted by existing conditions. At the same time it must be remembered that each person will react differently to the same set of circumstances. While one person may accept

the challenge to swim a great distance into deep water, another will not.

This difference in the *susceptibility to unsafe patterns of behavior* is the basis of the theory. People have different levels of tolerance in resisting unsafe behavior patterns. When the level of tolerance is exceeded, the person reacts in an unsafe manner and the resultant behavior makes him more susceptible to accidents.

This level of tolerance can be altered by introducing an intervening variable. Safety and driver education courses can make a student more conscious of unsafe behavior. In addition, marriage or the birth of a child will give added responsibility and help resist the tendency for unsafe behavior.

This theory attributes to accident-proneness the same level of consistency maintained by an attitude. Accident-prone characteristics can be changed and modified but this is, under normal conditions, a gradual process. In most cases, accident-proneness will vary in relation to the development of socially acceptable attitudes. That is, a person's susceptibility to accidents will decrease as he becomes more aware of the need for safe behavior and develops a readiness to respond to hazardous situations in a socially acceptable manner.

#### CHARACTERISTICS OF ACCIDENT-PRONENESS

Once a group of people having more than its statistical share of accidents has been identified, efforts to determine the reasons for this condition must be determined. Historically, two avenues have been investigated. First, physical differences have been studied to determine the extent in which defects in vision, hearing, reaction time, depth perception, strength, stamina, and so forth, contribute to accidents. While safety specialists believe these characteristics may be contributing to the total number of accidents, little evidence has been presented which isolates any of these factors as a cause of accidents. For example, research studies which have attempted to show a positive relationship between depth perception or reaction time abilities and rear-end automobile collisions have compared one group of drivers having rear-end collisions with an accident-free group. Both groups were given various depth perception and reaction time tests. After analysis, the test results could not identify any difference in depth perception or reaction time between the accident and non-accident groups.<sup>10</sup> Similar results have been received as other physical factors

<sup>10</sup> Leon Brody, *Personal Factors in Safe Operation of Motor Vehicles* (New York: Center for Safety Education, New York University, 1941), pp. 39-45.

have been evaluated in an effort to identify a relationship between physical abilities and accidents.

In analyzing and evaluating the results of the research studies on physical abilities, a number of factors must be considered:

1. Are testing instruments sufficiently discriminating to identify differences which might exist?
2. Are research designs adequate and samples large enough to identify significant differences?
3. Are self-selection factors eliminating the people who might be more susceptible to accidents? For example, the elderly person with slow reaction time might decide not to renew his license because of his physical handicap. If this same person works in a hazardous occupation, he may retire or request a transfer to a department which has work within his physical limitations. Since most studies in this area have used either traffic or industrial personnel as their study group, this factor could account for the lack of significance between study groups.
4. Do present traffic laws, industrial employment laws and regulations eliminate those who might be susceptible to accidents as a result of physical handicaps? It is obvious that a blind person could not drive safely. At some point or range between total blindness and 20/20 vision, the factor of accident causation must change. It seems probable, therefore, that visual tests and medical eye treatment are adequate to eliminate the drivers who are physically unfit to drive. A similar situation exists in industry where medical control is even more rigid.

Even though all these factors probably enter into the nonsignificant status of physical handicaps, it is not possible to disregard the fact that accident-prone characteristics exist in all individuals. As a result, another avenue to identify this condition must be investigated.

The second characteristic, personality, has been identified as an important consideration when studying people involved in accidents. The role of emotions in accident causation was described in a previous section. Since a person's susceptibility to emotional involvement is a factor of personality, it should be placed in this category as a contributor to the degree of accident-proneness. Since emotional outbursts are unpredictable and usually triggered by surrounding conditions, they are a major factor in determining whether a safe or unsafe pattern of behavior will be selected. An emotional outburst which might result in the violation of a safety rule and, as a result, cause an accident, might never be repeated, since the factors which caused the outburst might never again exist. For

example, the death of a husband or wife, divorce, or loss of employment might surpass a person's normal tolerance and make him susceptible to accidents for a short period of time. Once the person recovers, he regains his normal behavior patterns.

It should not be assumed that everyone having an accident is accident-prone at the time of the mishap. On the contrary, it has been impossible to eliminate the role environment plays in accident causation. Defects and inadequacies of industrial equipment, bad housing, long hours of routine work, improper traffic regulations, inadequate playgrounds, and poor training for the job are all factors which may predispose people to accidents.<sup>11</sup> In most cases, the ways in which the above conditions promote accidents is through their effect on the emotions or other personality factors of the individual. Factors such as fatigue, pressure of unfinished work, or worry can temporarily alter the personality of the individual and make him more susceptible to accidents.

At best, accident-proneness is not a simple concept. Personality factors seem to offer the greatest opportunity for studying it. In a study of personality characteristics of youthful accident-repeating drivers, Rommel points out that "individuals who have had the following experiences have a tendency to manifest accident-producing behavior.

1. A desire to leave home.
2. An urge to do something harmful or shocking.
3. A tendency to be influenced by people about them.
4. Association with peers to whom parents object.
5. A desire to frighten other individuals for the fun of it.
6. A tendency to become readily impatient with people.
7. A tendency to be somewhat suspicious of overly-friendly people.
8. A possibility of having been in trouble with the law."<sup>12</sup>

#### SELF-DESTRUCTION AND ACCIDENT-PRONENESS

An important facet of accident-proneness is its possible relationship with self-destruction. A speeding automobile recently crashed into a solid embankment in a small western city, killing both the driver and his wife. The impact speed was estimated at nearly 100 miles per hour, with no indication that an attempt to stop was made. On investigation it was

<sup>11</sup> E. R. Weinerman, "Accident Proneness: A Critique," *American Journal of Public Health*, Dec. 1949, p. 1527.

<sup>12</sup> R. C. S. Rommel, *op. cit.*, p. 14.

determined that the driver was awake, under control, and deliberately committed murder (his wife), and suicide. This is not a case of accident-proneness but the psychological problems of suicide and murder. The car was merely the weapon used.

Psychiatrists have pointed out that man has a self-destructive tendency. Like so many psychological and psychiatric variables, this tendency is on a complex continuum. It is possible that a person's accident-prone characteristic is related to his tendency for self-destruction. He may, in essence, be accident-prone (manifest accident-producing behavior) in order to destroy or punish himself. This relationship between self-destruction and accident-proneness has been advanced by some psychiatrists, and briefly analyzed by Norman Lykes.<sup>13</sup> Further research is needed to investigate this relationship, thereby providing additional information in the complex relationship of personality and accidents.

#### EFFECT OF PERSONALITY TRAITS ON PHYSICAL ABILITIES

In attempting to evaluate the ways in which personality variations can be explained as a factor in accident causation, the relationship with physical abilities must be studied. The factors of self-destruction, both conscious and unconscious, have been considered, and they have certainly been found to contribute to the number of accidents recorded daily. While physical abilities have been shown to have little relationship to accidents, at least as indicated by present studies, one principal factor has not been considered. This is the actual state of a person's physical ability under emotional stress.

In the past, the reaction time, visual abilities, and so forth, have been evaluated under normal conditions. That is, the people having accidents and the accident-free groups were compared under laboratory conditions to evaluate differences in physical abilities. While this evaluation showed no differences, no evaluation has been made of the actual physical abilities that immediately preceded the accident. If personality factors such as emotional behavior were involved, the physical abilities could have been seriously modified from the normal and an accident resulted. For example, a person suffering from anxiety might be traveling to the hospital to visit a sick friend who is near death. A car suddenly stops in front of our anxiety-ridden driver. Under normal conditions, his reaction time would have

<sup>13</sup> Norman R. Lykes, *op. cit.*, pp. 1-9.

been sufficient for him to stop. Under emotional stress his reaction time could have been slowed enough to prevent his stopping in time. Under normal conditions this driver's following distance probably was adequate. However, under emotional stress he did not adjust his following conditions to the new reaction time. In this case, the principal cause of the accident was emotional stress, secondary factors of decreased reaction time and following too close were necessary for the principal cause (emotional stress) to result in an accident.

In order to evaluate both the physical and personality factors which exist prior to an accident, the University of California, Los Angeles, with the aid of a private grant, is constructing a *simulator* of the type conceived by the engineer and artist in Figure 4:1. This simulator will permit the duplication of realistic driving conditions and still permit the complete evaluation of many facets of the role of psychological and physical abilities as causes of accidents.

### EFFECT OF ALCOHOL ON PHYSICAL ABILITIES

The relationship of alcoholic beverages and accidents probably has received more publicity than any other facet of accident prevention. The effect of alcohol on physical abilities as well as personality factors has been studied and described in detail.

Alcohol, among other effects, reduces a person's ability to rationalize, evaluate, and determine action. These factors are all needed for safe driving. In addition, alcohol slows down all physical abilities. Reaction time, distance judgment, and visual abilities decrease in proportion to the amount of alcohol in the blood. This reduction in physical ability, plus the decreased psycho-physical abilities can easily result in an accident.

The same comments are applicable to any drugs which have the ability to alter either physical or personality factors. All contraband drugs plus many forms of medication fall into this category. Hazardous acts such as driving, working, and recreation should not be attempted when under the influence of alcohol and certain medication.

### FATIGUE AND PHYSICAL ABILITIES

A person who is tired or near the end of a long period of exertion is more likely to be involved in an accident than an alert and rested person. This situation accounts for part of the high accident rate in the home.

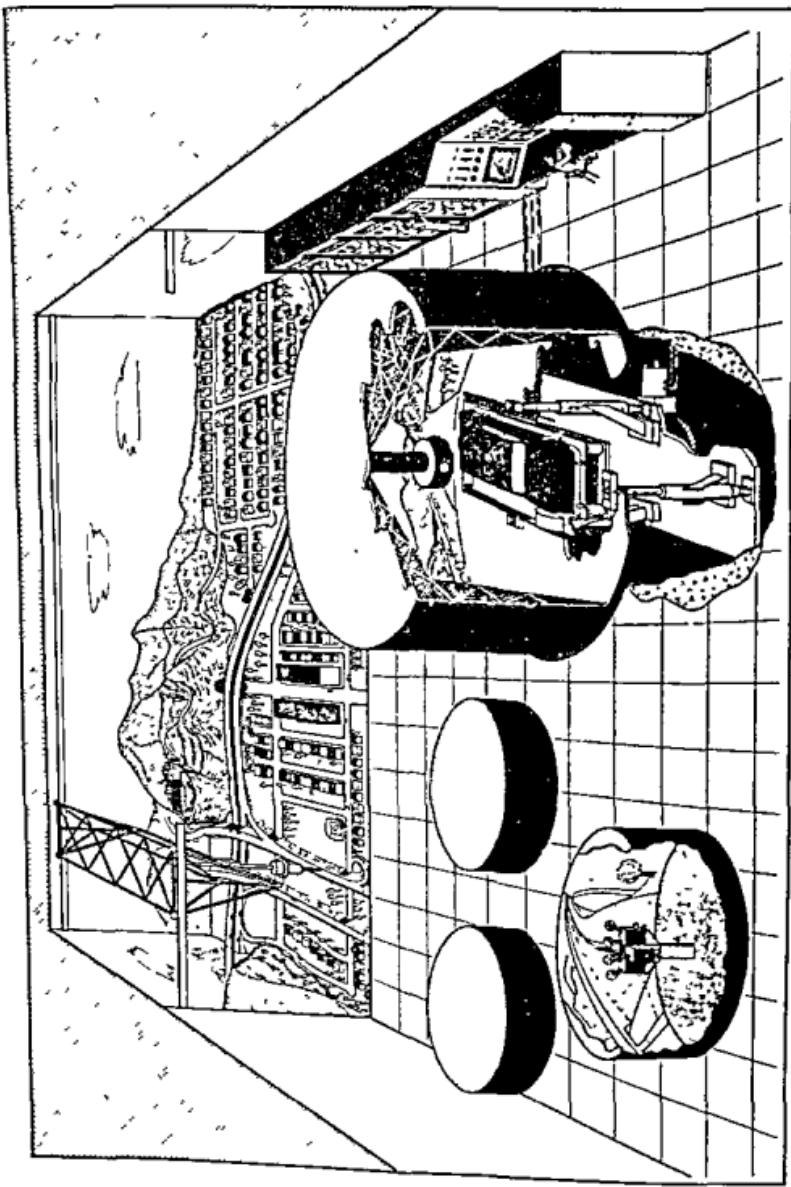


FIGURE 4:1. Driving simulator research facility. An automobile is "driven" on steel rollers and the driver views a scene that is relayed by TV. The driver's actions control the movement of the TV camera across the model landscape. The motion picture projection booths (left foreground) provide the driving scene to the driver when he leaves the model landscape. Physical movement is simulated by tilting the entire platform (right foreground). Computers (right side) handle the complex task of coordinating movements of the tilting platform and TV camera.

(Courtesy Institute of Transportation and Traffic Engineering, University of California, Los Angeles)

Most "do-it-yourself" repairs are made after a day's work, when the person is long past his peak period of efficiency.

In relation to driving, accident statistics show a variation in frequency during different times of the day. Essentially, the morning hours (after sleep) are the safest. Accidents gradually increase as the day progresses—with evening and night being the most dangerous. Obviously, many factors enter into this variation. Visibility is poorer in the evening and at night, making driving as well as recreation and the home more dangerous. Teen-agers and young adults (18-25) represent a higher proportion of the group driving at night. The cause-and-effect relationship between accidents and driving periods of young adults has never been evaluated completely. That is, is the time during which young adults drive most the reason for their poor records, or are the records poor because young adults drive during evening and night hours?

The driving and general safety abilities of a person decreases as the day progresses. Fatigue arrives and emotional stress can easily build up by the end of the working day. The result is a decrease in physical abilities due to both physical and psychological factors. The end result is an increase in the person's susceptibility to accidents.

### **PSYCHOLOGY IN SAFETY ENGINEERING**

While designers, civil engineers, and safety engineers have little or no control over the psychological characteristics of people, they must consider safety factors as they develop, design, and construct commercial products and public roads. The civil engineer must consider monotony, fatigue, boredom, and other psychological factors as he designs roads and traffic patterns. While a straight road might be the shortest distance between two cities, curves and variety often are built into the road to help keep the driver alert and ready for the unexpected.

Special considerations must be made for product design. Electric toasters have to be built to guard against the knife pryer trying to remove a piece of wedged-in toast. Seat belts have to be easy to put on and off, otherwise people will not use them. Even with quick release and adjustment features, seat belts are frequently sat on rather than under.

Whenever a product or facility for consumer use, which possibly might contribute to an accident if misused, is developed, care must be taken to guard against misuse, neglect, and uncontrollable psychological variables which might result in accidents. To guard against misuse and neglect,

designers attempt to build in safety features and have their products checked for safety factors by unbiased groups, such as Underwriters Laboratory. To guard against psychological factors, such as highway hypnosis, designers must develop variety and build into the situation factors which will resist the possibility for human error.

## SUMMARY

In attempts to identify the principal causes of accidents and determine methods of accident prevention, psychological factors must be given careful consideration. The principal method of combating the accident problem is through a sound program of education of both children and adults. This education must center on the development of socially acceptable attitudes and habits. In addition, it must consider the multiple effects of an individual's personality on his behavior pattern.

The majority of accidents which occur can be traced to human error. Often the cause appears to be some mechanical failure or defect or seems to be the result of "bad luck" or "fate." Upon careful investigation the cause can often be traced back to some human error, such as neglect, or disregard for the warning signals often preceding mechanical failure. A brake pedal which travels slowly to the floorboard when depressed and held is an early warning of brake failure. A steering system that sticks or has a tight spot or has considerable free travel often precedes steering failure. These and many other changes should call attention to pending failure. When warnings of this type are ignored, any resulting accident should be charged to human error rather than mechanical failure. A mechanical device which will last forever has never been developed. Mechanical failures should be anticipated and guarded against.

In conclusion, safety should become a principal concern of everyone. It must be considered whenever the decision to engage in a particular activity is being made. Safety should contribute to the enrichment of a person's way of life by helping him enjoy new activities and seeing projects completed in a safe and efficient manner.

Once an activity is decided upon, every effort should be made to conduct the activity in the safest possible manner. Some of the most potentially hazardous occupations have the finest safety records, because the people involved realize the potential danger and take the necessary precautions to minimize the number of hazards, thereby eliminating much of the opportunity for human error.

## ACTIVITIES

1. Prepare a class report on the different ways safety can become a part of a person's value structure.
2. Identify, with a written report, the ways in which this chapter will help you in becoming an effective teacher? Industrial safety specialist? Parent?
3. Plan a class "brainstorming session" to identify the different theories and concepts presented on the question of being accident-prone. Each class member should prepare for this session by supplemental library research.
4. List the ways in which emotions can affect a person's ability to avoid potential accident situations.
5. Prepare a paper showing the factors of human behavior which must be considered in the plans for a household appliance (your choice). A freeway, expressway, or turnpike? Equipment for some sport?

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# Principles and Techniques of Accident Prevention Programming

THE ONLY SOUND APPROACH to the development of an effective accident prevention program is through the application of basic principles and techniques that have been established *in actual operation*. This premise has been proven many times over during the past half-century of safety work. The "Posters and Pep Talks" approach to industrial safety did not do the job. The apparently appealing, although essentially negative, slogan, "Safety First," failed to bring the necessary degree of safety into the school program. Highly publicized campaigns and catchy slogans like "Speed Kills" and "Courtesy is Contagious" have not resulted in the desired reduction of traffic accidents. Although these techniques may have a place in accident prevention work, they never constitute a complete program of safety by themselves. Too often they are, rather, an expedient to take the easy way out, to give lip service to safety; but they fail to do the hard work that is necessary to make a safety program function.

Safety must be approached in a positive, businesslike manner. There is no single panacea that will prevent all, or even a major portion of the accidents. To reduce accidents to a minimum it is necessary to develop a well-balanced program that will take advantage of all known and proven principles and techniques of accident prevention. This chapter will be devoted to a discussion of these *principles and techniques and their application in an effective program of accident prevention*.

## ADMINISTRATIVE PRINCIPLES

It is essential that responsibility for all aspects of the accident prevention program be clearly delineated. The source of the primary responsibility for safety must be identified, and individual responsibilities and authority designated if functions are to be carried out successfully. This clarification of responsibility for the program, together with clearly stated policies governing safety activities and the operating rules and regulations through which the policies are administered, forms the foundation for successful accident prevention work.

### A MANAGEMENT FUNCTION

Safety is a management function. Management of any corporation, organization, school, or political subdivision is responsible for the conduct of the entire operation under its jurisdiction. "The moral obligation of an employer to his employee and to society requires that a reasonably safe working environment be maintained."<sup>1</sup> The accident prevention program which will provide improved safety in working conditions and ensure the safety of persons coming in contact with various phases of the operation is a management responsibility. Because of the controls it exerts over the operation of the organization involved, management automatically becomes the key to the safety program. Enlightened modern management recognizes this responsibility and makes adequate provision for it. It has been found that, in general, management has an understanding of its social responsibility to provide this safeguard for the welfare of its employees and of the general public. A good safety record is a desirable factor of favorable public relations of both private and public agencies. Also, it has been proven that safety is a sound business practice. "The importance of the safety engineer in a profit minded business is to first *prevent* accidents."<sup>2</sup> Since the prevention of accidents is the best means of controlling costs of insurance and other losses due to accidents, safety programming is a major concern of management.

Management controls the tools of accident prevention. It determines the budget, employs the personnel, establishes the supervisory program,

<sup>1</sup> H. W. Heinrich, *Industrial Accident Prevention* (third ed.) (New York: McGraw, 1950), p. 42.

<sup>2</sup> M. G. Bullock, "Dollars and Sense of the Motor Vehicle Accident Problem," *Journal of the American Society of Safety Engineers*, June, 1962, p. 19.

and formulates policies of the organization. These are all board-level management functions, whether the board of directors of a corporation, a school board, or the town council. The manner in which these responsibilities are recognized and assumed by board-level management will determine the extent and effectiveness of the safety program of the organization.

#### **TOP MANAGEMENT MUST BE SOLD**

The specific needs in the area of safety are most apparent to the supervisory-level employee. He makes direct contact with employees in the performance of their tasks and he meets the general public as it comes in contact with his organization. It is also the responsibility of the supervisory-level employee to carry out the accident prevention functions of the organization. Because of their intimate contact with these important aspects of the operations, it is usually the supervisory-level employees who are most enthusiastic about the needs for an organized safety program. For these reasons it is a continual challenge and responsibility of supervisory-level employees to sell top-level management on the needs for a comprehensive accident prevention program and advise them of the best means for the implementation and conduct of such a program. Until top management has been sold on the need for a safety program there will be none.

#### **DEFINITION OF RESPONSIBILITY**

If a safety program is to achieve its objectives in any organization, it is essential that safety responsibilities be clearly defined. This applies to a clear definition for the over-all operation of the safety program, as well as to specific responsibilities for safe practices for all employees.

Responsibility for the over-all safety program in any organization must be centered in one person. Safety may be a full-time or a part-time assignment of the designated person, depending largely upon the size of the operation. However, the operation of the safety program must be definitely assigned to him and placed under his control. Application of the old adage that "safety is everybody's business but nobody's responsibility" is a sure road to an ineffective safety program. This approach to the problem leads to an absence of co-ordinated efforts, well-defined objectives,

and maximum safety efforts throughout the operation of the organization.

Although over-all program responsibilities must be vested in one person, every employee has an individual responsibility for following safe practices and contributing to the general safety effort. These individual responsibilities should be clearly defined so that each person knows exactly what his responsibilities are, how they are to be carried out, and the consequences of his failure to assume them.

#### DESIGNATION OF AUTHORITY

A safety program will not function properly unless authority for carrying it out is clearly placed in the hands of those persons who have been assigned responsibility for its administration. This is true regardless of the position of responsibility within the framework of the safety program.

The person with central authority for the safety program will be unable to carry out the objectives of the program if he is given a responsibility but not the specific authority to require compliance to the orders and directives of the safety program. He must be responsible directly to top management. However, in order to make the program function, he must have his authority clearly defined so that he can determine the nature and scope of his own operations. Also, his position of authority must be clearly defined for his subordinates and all other employees, so that they will know that he has management support in carrying out the safety program.

Much of the functional operation of the safety program in any sizable organization is carried on by supervisors, department heads, and foremen-level management employees. It is important that their authority be delineated so that they will be able to perform their duties and obtain compliance with their directions relating to safe practices and procedures.

#### POLICIES AND RULES AND REGULATIONS

A safety program cannot function properly unless there are clearly stated organizational policies relating to safety and the administrative rules and regulations necessary to carry out the policies. The policies and rules and regulations should be written and made available to all employees so that they can understand the purposes and objectives of the safety program. Then they can be held accountable for their responsibilities with regard to the operation of the program. Cecil Zaun, supervisor of safety for Los Angeles City Schools, said, "Life and limb are too precious to be

risked while someone searches for specific safety regulations. Why aren't all safety rules and policies collected in one convenient file or handbook, properly indexed, and distributed to all administrators and people responsible for safety in particular activities?"<sup>3</sup>

Policies regarding the safety program are developed by top management. In governmental agencies policies are usually stated in the form of laws enacted by the legislative bodies of the federal, state, or local governments. They form the official operating structure around which the safety program and activities are developed.

Rules and regulations are written administrative orders that provide the means of administering the program that is established by the safety policies. In governmental agencies these rules and regulations are usually found in administrative codes that govern the administrative practices and procedures to be followed to make the laws operable.

### STEPS IN ACCIDENT PREVENTION PROGRAMMING

Setting up an accident prevention program is an important phase of the operation of any organization and must be approached in the same businesslike manner that is followed in any other phase of the organization. Unfortunately, safety activities too often have been conducted on an emergency, emotional, or single-phase basis. The results of such approaches have been uniformly ineffective in obtaining long-range results in the prevention of needless accidents, with resultant costly inefficiencies in operation and the waste of human and economic resources.

If a retail store is planning the opening of a new location, it will study carefully all aspects of the business opportunities available. It will conduct a survey to determine potential numbers of customers and their buying potential and practices, evaluate competition, and learn other factors that would determine the possible success of the particular type of business to be conducted. Based upon these data, it is able to determine the degree of success that might be anticipated in a store in the selected location. If a safety program is to be successful in the achievement of its objectives, the same careful, businesslike analysis must be made to determine its nature, scope, and objectives. It has been said that in safety programming ". . . any remedial program must be commensurate with both the depth and the scope of the problem."<sup>4</sup> This is equally true in any area of safety work. In the establishment of a safety program, management should

<sup>3</sup> Cecil G. Zaun, "Needed: Handbooks," *Safety Education*, Feb. 1960, p. 18.

<sup>4</sup> Leon Brody and Herbert J. Stack, *Highway Safety and Driver Education* (Englewood Cliffs, N.J.: Prentice-Hall, 1954), pp. 43-44.

follow these four steps: (1) get the facts, (2) determine the needs, (3) develop an action program, and (4) obtain support for its program.

#### GET THE FACTS

Before any problem can be solved it must be defined. This is as true in the field of safety as it is anywhere else. In order to define the accident problem, the accident facts of the particular operation must be obtained. Such facts may be available through accident reports, or it may be necessary to conduct a special survey to obtain them. Because of the basic need for valid facts upon which to build the accident prevention program, it is obvious that establishing and maintaining an adequate system of accident records and reports will become an important phase of organized safety work. This aspect of the program will be discussed in detail later in the chapter.

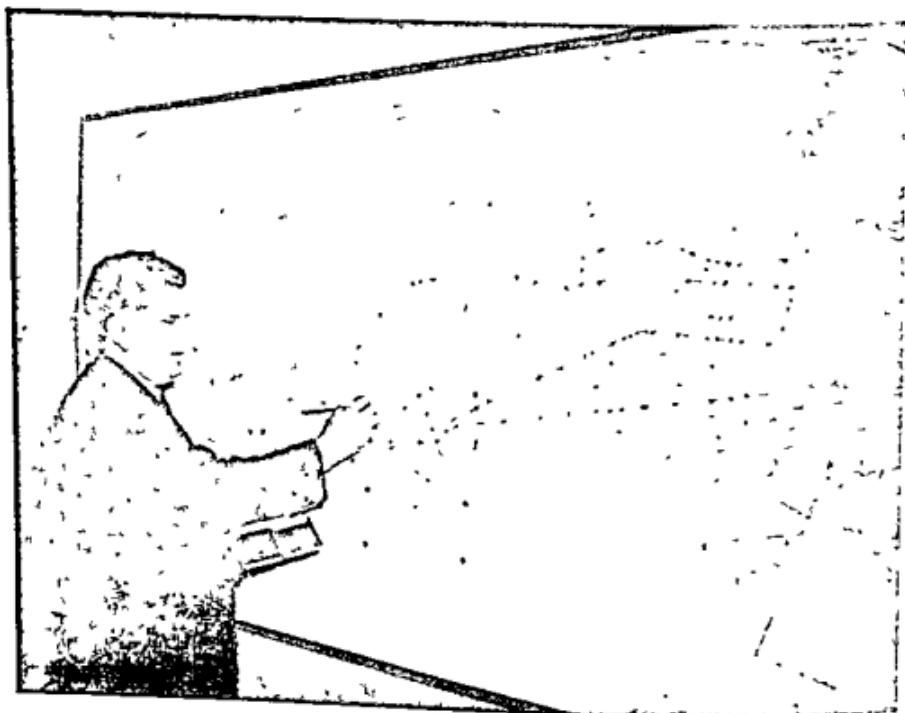


FIGURE 5:1. Keeping this spot map up to date provides current accident facts upon which enforcement activities can be planned.

(Courtesy Oakland, California Police Department)

The fact-finding procedure becomes the basis of any proposed accident prevention program whether it be in industry, schools, the field of public accidents, or elsewhere. Management of agencies or organizations must find how many accidents are occurring, when and where they are happening, to whom they are occurring, and, as nearly as possible, why they are happening. True accident causes are difficult to determine, but any information that will suggest what human errors or environmental hazards are contributing to the accident problem will be most helpful in setting up an accident prevention program.

The following example of a school situation will show how each phase of building an accident prevention program will evolve from the accident facts to provide a means of reducing the accident problem in this school. In this section the facts will be obtained. The example will be continued as each step in setting up the program is discussed. The facts in this example are obviously oversimplified for purposes of illustration. Later, these facts will be used to show how the Lakeside School determined its needs, developed an official action program, and obtained the necessary support to make its program a success. A survey of the Lakeside School records revealed this distribution of major classes of accidents:

Per Cent of Accidents	Type of Accidents
40	Playground
25	To and from school
15	Hallways
10	Bicycles
10	Other

#### DETERMINE NEEDS

Accident facts reveal accident prevention program needs. When the facts have been gathered, the second step in setting up an accident prevention program becomes one of analyzing those facts to determine programming needs. *Determination of needs should be established upon a priority basis*, giving first priority to those problems which are contributing most seriously to the accident problem of the organization. This procedure will assure the concentration of effort on the problems with the greatest need for improvement and with the greatest potential for making an effective reduction in the accident frequency and severity rates.

In the determination of safety needs at the Lakeside School, it is readily apparent that the greatest need is for the prevention of accidents on the playgrounds. Playground safety, then, becomes the number one priority need and will be given greatest emphasis in terms of time and money spent to reduce accidents in that school. Number two priority, based on accident facts, will be "To and From School" accidents. This will receive second consideration in program development, and safety in hallways will be third. For the present time the efforts being made toward safety for bicycles and other school safety will be continued, but no new attention will be given to these problems until the problems of greater priority need have received first consideration.

Programming needs do not remain static. As an accident prevention program for the school is developed and put into continuous operation, the accident facts will reveal that some types of accidents have been reduced, placing other types of activities as those most in need of attention. Thus, a new analysis of needs must be made, as well as a new assignment of priorities based upon the different needs as revealed by the accident facts. It is essential to prepare an annual summary of accident statistics for the school in order to keep the accident prevention program in keeping with current priority needs.

#### THE ACTION PROGRAM

The third phase of setting up an accident prevention program is to develop an action program designed to solve the most important safety problems, as revealed in the list of priority needs. This will involve, first, an analysis of each of the needs and, second, the application to each need of the techniques of accident prevention programming that will be most effective in reducing accidents in that area. It is the responsibility of management of the agency or organization involved to determine what techniques it will employ and to organize them into an action program. As the responsible body involved, it will request the support of all persons for the program which it intends to carry out. Because this is the program of the responsible officials involved, it is referred to as "the official action program."

Based upon the established priority needs, the officials of the Lakeside School might well set up an action program that would include the following:

1. Replace hazardous or faulty playground equipment.

2. Increase playground supervision.
3. Give specific instruction in the use of hazardous equipment.
4. Conduct instruction in proper crossing at intersections.
5. Establish a school crossing guard program.
6. Obtain a nonskid material for the maintenance of hallways.

#### OBTAI<sup>N</sup> ORGANIZED SUPPORT

A safety program will be successful only to the degree that the persons for whom it is intended co-operate in giving it their support. People are somewhat reluctant to take necessary measures even though they know that those measures are for their own personal safety, particularly if it in any way restricts their activities or if they do not clearly understand just what advantages will result if they co-operate. It then becomes necessary for persons responsible for a safety program to educate the people involved in the activities in the needs and proper techniques of the given activity. This is referred to as gaining organized support for the program.

It is axiomatic in safety work that the more persons become involved in the planning and execution of the accident prevention program, the more personal interest they take in it and, to that extent, will co-operate in making it a success. If they feel that it is *their* program, they will work to make it successful. This is the fundamental premise of the organization of community safety councils or safety committees in different agencies and organizations. The most successful local chapters of the National Safety Council are those chapters that have obtained the active participation of community leaders in both the necessary fund-raising activities and the program activities of the council.

In the case of Lakeside School, an "official action program" has been developed for which support can be sought. School officials will not be asking persons to "Be Safe." Rather, they will be seeking specific action that will contribute to over-all school safety. Replacing hazardous equipment will require funds that may come from the school budget, the PTA, or perhaps a local service group. Increased supervision will require more time of the teachers. Instruction in proper use of equipment will involve teachers and students. The crossing guard program will require co-operation of the police and local organizations and a budget. Materials for hallway maintenance will require working with the custodians. Carrying out the Lakeside School action program will require the co-operation and active participation of many people.

The "official action program" of Lakeside School is based on the real accident facts. Because a well-conceived program of accident prevention has been based upon those facts, the school officials have a sound basis upon which to ask the support of many groups of people to carry out their program. They have specific objectives and specific things to be done by each of the groups involved. For this reason it is likely that the various groups will co-operate in carrying out their responsibilities in each phase of the program. This program should result in the desired reduction of accidents at the school. All of the co-operating groups will know the part they have played in reducing accidents and will feel a sense of pride in their joint achievement. These groups should be given proper recognition for their part in reducing school accidents. As a result, they will take pride in their contribution to the reduction of school accidents and will be willing to co-operate in future safety activities of the school.

### BASIC ELEMENTS OF AN ACCIDENT PREVENTION PROGRAM

There are a number of basic functions that must be considered in the development of a successful accident prevention program if it is to achieve the long-range objectives of reducing accidents to the irreducible minimum and maintaining them at that desirable level. Each of these functions is a major part of a complete program but in no sense can be considered to be a *program* in itself. The successful attack on the accident problem requires a balanced program which includes a concentration on each of these accident prevention techniques. This fact was well stated by William Randolph Hearst, Jr., Chairman of the President's Committee for Traffic Safety, in speaking of the traffic accident problem facing the nation. Although Mr. Hearst speaks of traffic safety, his thoughts concerning a complete, balanced program apply equally to safety in school, home, industry, or public places.

Over the years a so-called "Action Program" or a set of 9 or 10 "commandments"—fundamental, desirable conditions—have been set out. These include uniformity of traffic hand signals, rules and signs of the roads between states, laws and enforcement procedures, and youth training in driving.

All go hand-in-hand with an understanding by teachers, parents, businessmen, civic organizations of what we are doing and why, so that a climate is being created for support and enforcement of the entire program.

Too often well-meaning souls go off on a tangent and feel that the core of

the problem is either liquor or speed and that the answer lies in any one of various points of our Action Program. But, experience has shown that if you only put in half the program you don't even get half the good. It's only when all of it is put into effect that full results are obtained.<sup>5</sup>

Each of the elements of the accident prevention program should be considered as a *function* rather than a specific individual or duty. A good example of this is the important function of enforcement. When a person thinks of enforcement it is usually in terms of a policeman who writes citations for traffic violations. However, in accident prevention programming, it must be considered as the function of enforcement instead of a person or a job. When a mother spanks her child for playing in the street or a supervisor disciplines a workman for operating an unguarded machine, they are performing enforcement functions.

The proven basic elements or techniques of an accident prevention program to be discussed in this section include: accident records and reports, enforcement, education, engineering, selection and placement of personnel, training, incentives, and evaluation and research.

#### ACCIDENT RECORDS AND REPORTS

All accident prevention work must be based upon facts. The only way to obtain adequate facts upon which to develop an accident prevention program is to maintain accident records and reports that will reveal all facets of the accident problem of the city, school, industrial plant, or other agency concerned. The details of accident reporting are discussed in Chapter 7. Although the student accident report is used as an example, the same basic factors of accident reporting are found in all accident reports. "Since the completeness and accuracy of the entire accident record system depend upon the information in the individual accident reports, simple forms which can contain all essential data must be used."<sup>6</sup> The report should reveal such basic information as the time, location, and circumstances of the accident. Also, it should give the nature and extent of the injuries and other pertinent data that will be useful in developing measures to prevent similar accidents. "A study of accidents which have caused injury to persons or damage to equipment is worth while only

<sup>5</sup> William Randolph Hearst, Jr., "Editor's Report," *San Francisco Examiner*, Jan. 21, 1962, p. 2.

<sup>6</sup> Maxwell N. Halsey (editorial consultant), *Accident Prevention* (New York: McGraw, 1961), p. 168.

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<sup>6</sup> Maxwell N. Halsey (editorial consultant), *Accident Prevention* (New York: McGraw, 1961), p. 168.

when the information is used to prevent the reoccurrence of these and similar type accidents."<sup>7</sup>

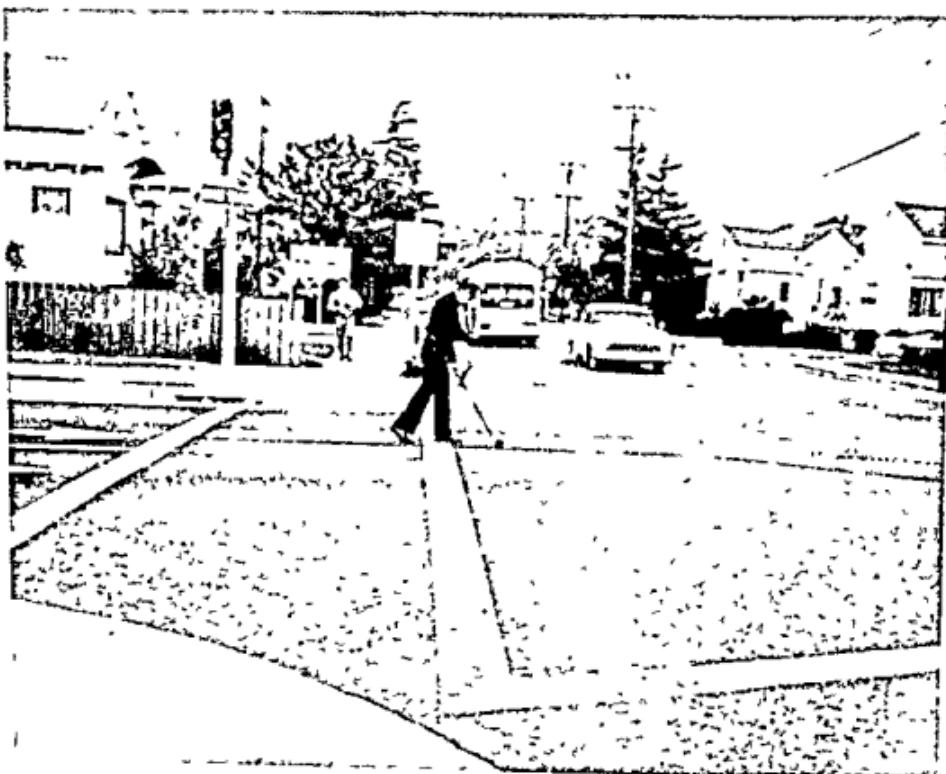


FIGURE 5:2. A sound accident prevention program is based upon accident reports which contain accurate, factual data.  
(Courtesy Oakland, California Police Department)

From the viewpoint of accident prevention, the accident report should be a working document that can be analyzed in terms of basic causes of the accident and potential precautionary measures that can be taken to prevent similar accidents in the future. It should be complete yet simple, so that it can be filled out as easily and accurately as possible. A very comprehensive form will not serve its purpose if it is so complicated that it cannot be filled out completely and accurately. The accident report should be completed as soon after the accident as possible to avoid inaccuracies due to passing of time. It should be completed by the injured

<sup>7</sup> Los Angeles City Schools, Division of Instructional Services, *Report of Accidents to Pupils and Employees, 1959-60* (Los Angeles: Board of Education, 1961), p. 59.

party or a supervisory employee. Accident reports should be distributed to all persons who have a responsibility for safety in the organization. The original copy of the report should be maintained in a permanent file for reference in the event of legal action arising out of the accident.

Employees should be trained in the preparation and use of accident reports. If persons completing the reports have had instruction in the need for maintaining accurate reports and the methods in completing them, they will provide more uniform and useful information. The interpretation of accident records and reports is an important function requiring specific training. The Northwestern University Traffic Institute has conducted classes in accident records and reports for motor vehicle administrators for many years. Persons handling accident records in other kinds of operations should be as well qualified to perform their functions as are motor vehicle administrators.

#### ENFORCEMENT

The function of enforcement should be to act as a deterrent to behavior in violation of established rules and regulations. The most familiar example of the enforcement function is the two-phase operation in which the traffic officer issues citations for traffic law violations and the courts determine the nature of the violations and the appropriate penalty to be assessed the guilty parties. A similar enforcement function is being performed when a foreman reports an infraction of a company regulation and a safety committee determines the nature of the violation and assesses disciplinary action. If the enforcement function is to act as a deterrent to accidents, it is necessary to have both of these responsibilities carried out in an impartial, consistent, and realistic manner. It is necessary for every organization or agency to establish its enforcement procedures, make them clearly known to all persons who might be involved, and to carry them out on a just and positive basis.

#### EDUCATION

If students, employees, or the general public are to follow safe and legal practices it becomes necessary to inform them of these practices through the process of education. Education is usually thought of as a formal classroom situation. However, in accident prevention, education for large groups often is conducted in a more informal manner. These

techniques are discussed in more detail in the section on adult education in Chapter 18. Employee meetings, bulletin boards, organization newsletters, and projects of various types are examples of safety education for large groups.

Formal education in safety is comparatively easy to carry out. A definite program can be developed and conducted in a given situation. The informal program is more difficult to establish but of primary importance in safety work in places other than schools. Because of time and other limitations, this informal education must be planned and executed most carefully. Repeated studies have indicated that persons involved in accidents, as a group, are usually less well informed on laws and safe practices than the accident-free persons. This suggests that any effective accident prevention program should include a well-thought-out program of education for all persons concerned.

#### ENGINEERING

Engineering applies to the design, construction, and location of various types of machines and equipment. It also applies to the routing and flow of vehicular and pedestrian traffic in any environmental situation. A great deal of emphasis has been placed on safety in engineering of vehicles, machines, and equipment in the past few years. Machines with proper guards, blowout-proof tires, and shatterproof glass are but a few examples of engineering for safety. However, safety in engineering is primarily a matter for industry. In the purchase of equipment, care should be taken to see that all safety specifications are met.

Cities employ traffic engineers to determine a safe flow of traffic, and industry relies on safety personnel to provide proper lighting and to develop proper routing procedures in its plants. Similar care should be taken in the routing of pedestrian and bicycle traffic in a school building or on school grounds, and in providing proper lighting in classrooms.

#### SELECTION AND PLACEMENT OF PERSONNEL

Placing a person in the proper job has been found to be effective in the increased production and accident prevention in the industrial community. This has become a highly developed practice in industry. The first thing to determine in personnel selection and placement is the requirements of the job. "The term *job analysis* refers to the procedures

employed in collecting information concerning the nature and conditions of the work involved in a given job."<sup>8</sup> A job analysis will determine the physical, mental, and emotional requirements of the position. Then, through a worker analysis, it is determined what persons have the particular combination of these requirements to be successful in the performance of the specific task. A highly imaginative person assigned to a repetitious, routine task or a poorly co-ordinated person assigned to perform tasks requiring a high degree of physical dexterity would be more inclined to be involved in accidents than persons more suited to the requirements of the job. The same procedure could be applied to employees in schools, governmental agencies, or other places. The school-bus driver should have the necessary qualifications to operate the bus safely; the teacher who will be teaching safety to children should have had some instruction in safety education in his teacher preparation program. Selection and placement of personnel is a factor in safety programming that is being followed more and more each day.

## TRAINING

Training employees in the development of the specific skills required in the performance of their assigned tasks has become an important phase of the safety program in most major industrial plants. Such training is given as pre-service training for new employees, in-service training to employees on the job, or retraining to employees in regular service who are transferred from one task to another in which the application of new skills is required. This is a safety programming technique of industry that can readily be transferred to other areas of activity.

## INCENTIVES

The use of different types of motivation to encourage employees and other personnel to follow safe practices is a technique that has demonstrated its value in terms of accident prevention. Everyone is interested in receiving some recognition for his accomplishments. If, when achievements in accident prevention have been accomplished, some recognition is afforded, it will be an incentive for persons to strive toward safety. Such incentives can be a safety flag for the elementary school with the best

<sup>8</sup> Edwin E. Ghiselli and Clarence W. Brown, *Personnel and Industrial Psychology* (New York: McGraw, 1948), p. 24.

safety record, a Christmas turkey for the employees of the department with the best safety record, or a recognition pin or gold watch for the driver who has driven for 20 years without a chargeable accident. Regardless of what it is, recognition for safe performance of the individual or group will be an incentive to reduce accidents. Persons who are developing safety programs should give consideration to this fact and attempt to establish some incentive program for the persons involved.

#### EVALUATION AND RESEARCH

There should be some means of evaluating various aspects of the safety program to determine if they are achieving the desired results. This must be done to determine over-all effectiveness of the program and to measure the value of particular aspects of the accident prevention program. The most frequent means of determining effectiveness of the program is to make a comparison of accident frequency and severity rates prior to and following the adoption of the accident prevention activities. Medical and insurance costs are another index that can be used. Regardless of the means of evaluation, every accident prevention program must justify its existence in terms of its effectiveness. It is desirable to prepare an analysis of accidents and accident costs to be presented to the governing board of the agency, or organization, periodically to keep it apprised of the achievements of the program. This is essential if a budget for future programming and approval of future projects are to be received.

Research projects that will assist in the development and implementation of new and improved techniques and procedures that will make accident prevention more effective are essential. Evaluation and research procedures to be used in safety work are discussed in greater detail in Chapter 19.

#### SUMMARY

Safety is achieved, in any area of human endeavor, through the development of a well-balanced program of accident prevention activities. There is no simple or easy means of realizing safety in the home, at work, in public places, in motor vehicles, or at school. There is no single project or activity that will provide safety. Safety may be achieved only through a businesslike attack on the broad social and economic problem of accidents.

There are certain tried and proven principles and techniques of accident prevention that must be applied to create a hazard-free environment peopled by individuals who practice safe behavior. Safety is a function and responsibility of management in any public or private agency or organization. Management must define responsibility, designate authority, and promulgate the policies and rules and regulations required to provide safety for employees and the general public. Then, a program of accident prevention must be developed through finding the facts, determining the priority needs, preparing an action program, and gaining support for the program. The basic techniques of accident prevention programming must be applied to the solution of the accident problem if it is to prevent the loss of human and economic resources through a reduction of needless accidents to the irreducible minimum.

## ACTIVITIES

1. Write a brief paper on the function of enforcement as a deterrent to traffic accidents.
2. Visit a police department. Prepare a report on how accident records and reports are the basis of selective enforcement policies of the department.
3. Arrange for a meeting with the safety engineer of an industrial plant. Have him explain the manner in which he continually "sells" top management on support for his program.
4. Prepare a paper describing the methods and techniques a community safety council would use to develop citizen support for local safety projects.
5. Visit a local school district. Evaluate its safety program on the basis of the principles and techniques of accident prevention programming discussed in this chapter.

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## Part Two-THE SCHOOL SAFETY PROGRAM

This part deals with all aspects of the total school safety program. The primary responsibilities of the school are to provide adequate instruction in safe living and a safe school environment for the students.

The school district is usually one of the major enterprises of the community. It is a major employer and operates a large and costly plant. In these chapters, the noninstructional aspects of school safety are treated as they would be in any other industrial safety program. Although the examples are school-oriented, the safety aspects of problems dealing with personnel, plants and facilities, transportation, and liability have direct relationship to safety programming in industry or other governmental agencies.

Included in Part Two are the following chapters:

6. *Organization and Administration of the School Safety Program*
7. *Creating a Safe School Environment*
8. *Safety Education in the School Curriculum*
9. *Methods of Instruction*
10. *Providing Safe Pupil Transportation*
11. *School Liability and Insurance Protection.*

# Organization and Administration of the School Safety Program

*EVERYBODY in the field of education has a positive and undeniable responsibility for providing instruction in safe practices and a safe environment for the millions of children in the nation's schools. This is a responsibility of the school board, the superintendent, the supervisor, the principal, the dean, the vice-principal, the counselor, the department head, the teacher, the student-teacher, the school doctor, the school nurse, the bus driver, the cafeteria worker, the custodian, and any other employee of the school district. Safety is everybody's business in the schools.*

*Basically, the responsibility for the total safety program for school youth rests with school management—the school board and the superintendent. They control the budget, select building sites, build and maintain the school plants, establish policies, promulgate rules and regulations, define responsibility, designate authority, employ teachers and noninstructional personnel, provide in-service training, and establish the program, both curricular and co-curricular, for the school. However, every employee has his own specific area of safety responsibility.*

*School administrators should develop a total safety program based upon the needs of both students and employees as revealed by accident experience. There are approximately 6,500 accidental deaths among school-age children annually. Figure 6:1 shows the types of accidents in which they are involved. Detailed statistics on accidents of school children are to be found in *Accident Facts*, the annual statistical publication of the National Safety Council.*

Accidents of school employees should be considered in planning a school safety program. Most frequent types of accidents among teachers and other school employees include falls, being struck by objects, and striking against objects.

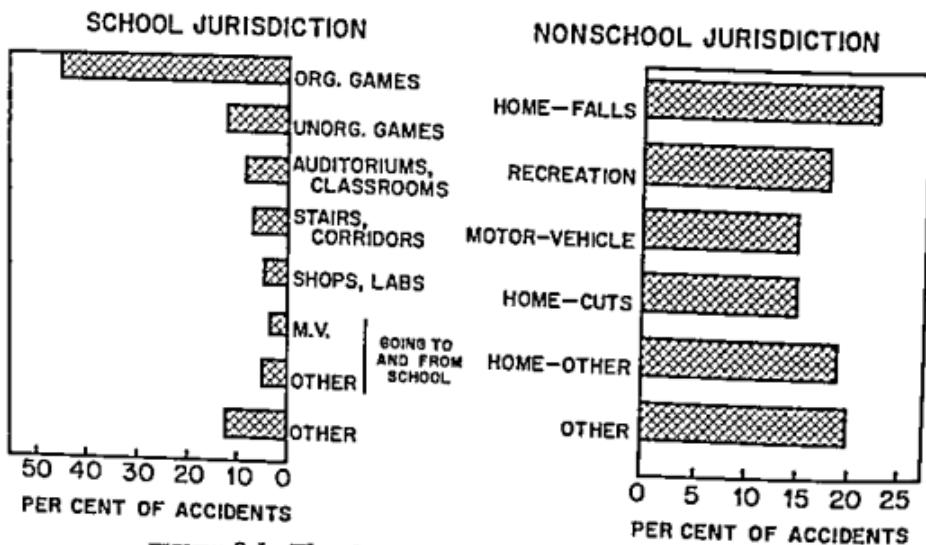


FIGURE 6:1. The charts indicate the relative importance in terms of accidents of various areas and activities in school and nonschool jurisdictions. The two charts should not be compared since reports are more complete for school jurisdiction than for nonschool jurisdiction.

(Courtesy National Safety Council)

A sound safety program in a school system is inevitably the result of sound planning. Although planning for the school safety program is a basic responsibility of school administration, the most effective safety planning will involve all school personnel, including employees and students. If these groups are brought into the planning of the safety program, they can make worth-while contributions to its development and they will co-operate more effectively in achieving its objectives. This chapter will discuss the elements of planning involved in the organization and administration of a total school safety program.

## THE FUNCTIONS OF ORGANIZATION AND ADMINISTRATION

An effective school safety program must be based upon sound principles of educational organization and administration. As with safety in

industry or elsewhere, school safety is a management function. Within the educational structure the functions of management are vested in the school administration. Thus, it becomes the responsibility of the school board and the superintendent to develop the organizational pattern for the total school safety program and to provide the administrative machinery to carry the organizational program through to purposeful achievement.

Organization and administration are separate but closely interrelated functions. Organization, or the planning phase of the program, must precede the administrative phase or there will be no program to administer. Unless the organizational phase of the program is followed by continuous administration, the organizational planning, regardless of its excellence, will not result in the attainment of the program objectives. This has been demonstrated many times in education. Excellent courses of study in safety education have been prepared and then not built into the curriculum pattern of the schools for which they were intended. The unfortunate results have been an absence of safety education in those schools and a failure to develop the sound patterns of safe behavior that would reduce accidents among school children. However, there have been many instances of well-organized school safety programs followed up with well-administered safety instruction and activities. This is particularly true in the larger school districts. To a substantial degree, these programs have been responsible for the spectacular reduction in accidental deaths and injuries among school-aged youth.

The functions of organization and administration are to be found wherever administration is carried on in business organizations, schools, labor unions, governmental agencies, or elsewhere. The manner in which these functions enter into the work of administrators is made evident by a study of Gulick's analysis:<sup>1</sup>

*Planning*, that is working out in broad outline the things that need to be done and the methods for doing them to accomplish the purpose set for the enterprise;

*Organizing*, that is the establishment of the formal structure of authority through which work subdivisions are arranged, defined and coordinated for the defined objective;

*Staffing*, that is the whole personnel function of bringing in and training the staff and maintaining favorable conditions of work;

*Directing*, that is the continuous task of making decisions and embodying

<sup>1</sup> Luther Gulick and Lyndall Urwick (eds.), *Papers on the Science of Administration* (New York: Institute of Public Administration, Columbia University, 1937), p. 13.

them in specific and general orders and instructions and serving as the leader of the enterprise;

*Coordinating*, that is the all important duty of interrelating the various parts of the work;

*Reporting*, that is keeping those to whom the executive is responsible informed as to what is going on, which thus includes keeping himself and his subordinates informed through records, research and inspection;

*Budgeting*, that is fiscal planning, accounting and control.

## ORGANIZATION

The organizational phase of the safety program is chiefly concerned with making arrangements that permit the realization of proposed objectives. However, since no organizational structure can serve its purpose if it remains static, it must be in a continual process of adjustment to meet changing needs and broadening objectives. Making such adjustments is really a process of *reorganization* which should be going on continuously.

Making the necessary arrangements that will permit successful realization of safety objectives will involve budget, school plant, materials and supplies, personnel (student, faculty, and noncertificated employees), records and reports, research, and legal requirements. In the organizational program, all factors must be co-ordinated to develop a functional organization plan. In their book, *American High School Administration Policies and Procedures*, Austin, French, and Hull say, ". . . the most intricate aspect of organizational work is this matter of coordination. If one word were to be used to show what we mean by organization, it would be the word 'co-ordination.'"<sup>2</sup> Thus, a major purpose of organization of the school safety program is co-ordination.

Obviously, the nature of the organizational structure of the safety program will be influenced by the size of the school district and the type of educational program that it maintains. In large school districts there should be a safety supervisor, director, or co-ordinator whose primary duty is the organization, administration, and supervision of the safety program. In the smaller district most of these functions may rest with the superintendent or members of his general administrative staff. However, regardless of the size of the district, responsibility for the total school safety program should be delegated to one responsible source. The 18th Yearbook of the American Association of School Administrators, *Safety*

<sup>2</sup> David B. Austin, Will French, and J. Dan Hull, *American High School Administration Policies and Practices* (New York: Rinehart, 1962), p. 14.

*Education*, states that, "Centralization of responsibility for the school safety program can be achieved in small systems as well as large ones."<sup>3</sup> Since the nature of the safety program relates to so many aspects of school and community life, program planning and administration in this area must include all schools within the district and all interested community agencies.

An important aspect of program organization is the promulgation of stated policies and rules and regulations that define duties and responsibilities of all school personnel, with regard both to the instructional program and to the protection of school children and property. These policies and regulations are issued by the board of education through the superintendent. They are usually prepared by the superintendent and his staff. The policy statements and rules and regulations become the foundation upon which the school safety program is based.

## ADMINISTRATION

Administration is that phase of the process of purpose achievement concerned with the conduct, operation, and management of the school safety program. Basic principles of school administration must be followed if the purposes of the safety program are to be achieved. Sound organization only provides the means of achieving the safety objectives. "Good administration is required to ensure continuous realization of the possibilities of good organization."<sup>4</sup> In carrying out the administrative aspects of the school safety program, the superintendent should:

1. Employ teachers with safety training and conduct in-service safety training for all school personnel to meet the needs of their job functions.
2. Provide for co-operative, democratic participation of all school employees and students in the conduct of safety instruction and activities. Define authority and responsibilities of each person.
3. Provide a centralized structure for organization and administration of the program.
4. Establish a program of accident records and reports to gather data on safety hazards and unsafe practices within the school's operation.
5. Provide a safe school environment.
6. Conduct a continuous program of evaluating safety instruction and

<sup>3</sup> American Association of School Administrators, *Safety Education* (Washington: National Education Association, 1940), p. 58.

<sup>4</sup> Austin, French, and Hull, *op. cit.*, p. 15.

activities within the school district. Revise the school safety program when necessary to meet changing needs as revealed by these data.

### ORGANIZATION FOR INSTRUCTION

Specific planning must be made for safety instruction in the school curriculum if safety education is to develop desirable safe behavior patterns in the students. The manner in which safety instruction is included in the curricular and co-curricular program of a school will depend in a large measure on the educational philosophy of the school district and the nature of the school curriculum. For this reason it is expected that emphasis on safety instruction will vary from school to school.

Safety education in the schools should be based on student needs, regardless of the curriculum structure. The importance of meeting student needs is pointed out by Edmonson, Roemer, and Bacon when they say, "Since education is provided for the purpose of developing the student individually and as a member of society, it is evident that the curriculum ought to be made to fit the student's needs instead of the student's being forced to conform to some ill-adapted curriculum."<sup>5</sup>

#### TYPES OF ORGANIZATION

Safety education has been planned into the school curriculum in a variety of ways to meet the needs of different curriculum structures. It has been taught as a separate course or as a separate unit of instruction within an existing course. Safety instruction also has been correlated with other school subjects or integrated into units of instruction involving various disciplines in the school curriculum. Some schools have used a combination of these patterns.

**SEPARATE SUBJECT.** With the introduction and rapid growth of driver education in the secondary schools, particularly following World War II, this area of safety education has been established as a separate course of instruction in a large number of schools. Also, general safety education is frequently taught as a separate course in secondary schools. However, pointing to the already crowded curriculum, many school administrators claim that there is not room for education for safe living as a separate course. They provide for integration or correlation of safety education in their school curriculum.

<sup>5</sup> J. B. Edmonson, Joseph Roemer, Francis L. Bacon, *The Administration of the Modern Secondary School* (New York: Macmillan, 1953), p. 60.

**UNIT OF INSTRUCTION.** Both safety and driver education have been taught as a separate unit of instruction within existing classes in a number of schools. In many cases this has been a unit of driver education placed in a course because of scheduling convenience. Often an unqualified and disinterested teacher has been required to replace instruction in English, history, or some other subject which he thought to be more important, with a unit in driver education. This practice has led to poor quality instruction and a general level of program that did not develop desirable attitudes or sound driving practices among the students.

**CORRELATION.** *Correlation of instruction* is "bringing together the elements of two or more different subject-matter fields that bear on the same large problem or area of human experience in such a way that each element is reinforced, broadened, and made richer through its association with the elements from the other subjects."<sup>6</sup> Such correlation has been made with safety and health and, in some instances, with safety, health, and driver education. The latter course appears in some school programs as sophomore science, or a similar course title, frequently on a full-year basis. A weakness of this approach to curriculum construction is that *teachers are rarely prepared equally in each area, and they tend to emphasize most strongly the subject area of their primary interest or training.*

**INTEGRATION.** Integration of instruction is "the process or practice of combining different school subjects and presenting them as aspects of one unifying project or activity."<sup>7</sup> Theoretically this appears to be good. However, in practice it frequently leads to an undesirable lack of emphasis on safety instruction because of lack of interest or training on the part of the teacher. Nihan said, "One of the dangers of integration is that a particular phase of safety may lose its identity in regular subjects."<sup>8</sup> Some administrators have proclaimed the values of safety education and said that such instruction was integrated into all aspects of their curriculum. However, upon inspection of the curriculum, it was frequently found that very little safety instruction was actually given except in specialized courses taken by only a small percentage of the students.

Generally speaking, safety education in the elementary schools is presented as either integrated or correlated instruction. In many secondary

<sup>6</sup> Carter V. Good (ed.), *Dictionary of Education* (New York: McGraw, 1959), p. 134.

<sup>7</sup> *Ibid.*, p. 292.

<sup>8</sup> James F. Nihan, *State Laws and Regulations for Safety Education*, Safety Monographs for Colleges and Universities No. 15 (Chicago: National Safety Council, 1962), p. 33.

schools, driver education and possibly safety education are separate courses or separate units of instruction; but safety is correlated or integrated into other aspects of the curriculum, too. This is a desirable practice. However, when this combination of instructional practices is used, precautions should be taken to ensure desirable articulation of safety instruction between the many subject areas from kindergarten through grade 12. Otherwise there is likely to be unnecessary duplication of some aspects of safety instruction and the total absence of others. If this practice is followed, it leads to disinterest on the part of students and a general failure to make safety education a meaningful experience in the total education of the student.

**CO-CURRICULUM.** Many safety activities of the school, such as safety committees, fire prevention week, safety patrols, and others, provide unique opportunities for emphasis on various aspects of safety. Provision should be made to obtain optimum value from these co-curricular activities for the purpose of instruction in safety education.

#### PARTICIPATION IN CURRICULUM PLANNING

There are many sectors of the school and community that can contribute materially to the planning of safety instruction in the school curriculum. Bringing persons from these sectors into the planning stages of the instructional program will lead to broader, more meaningful experiences and create wider acceptance of the safety curriculum. These groups include teachers, pupils, and representatives of community agencies and organizations interested in the objectives of safety education.

Teachers have broad experience and a background of professional preparation upon which to base their contributions to the program. They also take a creative pride in courses of study when they help plan and prepare them, and tend to make more advantageous use of them. The 18th Yearbook states that, "Teachers' opinion as to the proper form of curriculum inclusion of safety education is significant."<sup>9</sup>

Students have a vital interest in the instructional program because it will effect them directly. Through their participation they can assist in developing courses of study that will meet the needs and interests of the persons for whom the curriculum is prepared.

Many persons representing community agencies have broad experience in the field of safety and accident prevention that can enrich the instructional offerings. Frequently they can provide useful materials and

<sup>9</sup> American Association of School Administrators, *op. cit.*, p. 61.

act as resource persons for safety education classes. Parents are able to point out instructional needs as they exist in the homes and the community.

### **ADULT SAFETY EDUCATION**

There is sufficient evidence in accident statistics to indicate the need for more adult safety education. However, the public schools have not made much progress in this area except as a by-product of school safety education. Pamphlets, safety checklists, and similar materials taken home by the children have served a useful purpose but they have not been completely successful. Of the entire safety field, driver education and driver training have been the most common types of safety education available for adults. Adult classes also have been conducted for safety in such recreational activities as swimming, boating, and hunting.

### **ORGANIZATION FOR NONINSTRUCTIONAL SAFETY FUNCTIONS**

There are a number of school safety responsibilities in addition to instruction in safe living for the students. If these important functions are to contribute to safety in the schools, they must be just as thoughtfully planned as safety education itself. Many of these functions will be discussed in detail in later chapters, but they must be considered here in light of their implications for the organization and administration of the total school safety program.

Successful planning for noninstructional functions, just as planning for safety in the curriculum, requires the active participation of students, faculty, noncertified employees, and representatives of the community. Like other aspects of the school program, these functions also require budget, trained personnel, materials and supplies, maintenance, and other types of administrative controls. Some of the noninstructional safety functions include:

1. *Pupil and employee security.* School employees all have positions of responsibility which involve potential liability in the event of accidents. School facilities should be such that potential employee liability is kept to a minimum. Where it is legal to do so, there should be liability insurance protection for employees. Many school districts also have some type of accident insurance programs for the financial protection of both students and employees engaged in various school activities.
2. *Transportation.* Millions of school children are transported to and from

intersections, and perform many other duties that would be performed by a safety engineer in an industrial plant.

Employee safety is a responsibility of the safety supervisor in many districts. He must maintain accident records to determine hazardous conditions and unsafe practices that are contributing to employee accidents. It is recommended that in-service safety training programs be developed by the supervisor for the various classifications of noncertificated school personnel.

Because safety is so closely related to community life, the safety supervisor will work closely with many community agencies. These groups include parent-teacher organizations, civic and service clubs, automobile clubs, safety councils, police departments, fire departments, and many others.

### ACCIDENT RECORDS AND REPORTS

The accident record and reporting system provides the basic data upon which an effective total school safety program must be built. It is essential to know what unsafe acts and conditions are contributing to school deaths and injuries in order to know what preventive measures are necessary. Therefore, it becomes an administrative responsibility to establish a system of uniform accident records and reports that will provide the necessary data to develop an effective environmental safety program for both students and employees, and a sound instructional program in safety education for the students.

### PROGRAM ADMINISTRATION

There are a number of administrative functions involved in initiating a sound accident record and reporting system within the school district. The administration must establish policies requiring the reporting of all school accidents. This reporting must be designated as a responsibility of all school personnel. Teachers and other persons, including students, should be instructed in the correct procedures in reporting an accident, and teachers should be shown how to complete the report correctly. Arrangements must be made in advance with doctors and hospitals to care for emergency situations. Provisions also must be made for the immediate notification of parents or guardians of injured students. Appropriate records must be maintained, readily accessible, for the protection of all

school personnel in the event of any legal action arising from a school accident. These are routine administrative matters but they are an important part of planning for the total school safety program.

### PREPARING STUDENT ACCIDENT REPORTS

Every student accident should be properly reported immediately following its occurrence. It is recommended that school districts adopt the Standard Student Accident Report System of the National Safety Council. This reporting system, used in a large number of schools throughout the nation, has been in operation for over 30 years. Under the guidance of a committee composed of school administrators, supervisors, teachers, and safety experts, this system has been developed, used, and periodically revised to meet ever changing conditions and needs. Many schools have made minor revisions in it to meet local needs. However, if school accident reports are to provide effective sources of data on student accidents, it is necessary to maintain uniformity in the basic elements of the Standard Student Accident Report. Only in this way will it be possible to develop reliable data that will provide a basis for comparing the effectiveness of one school accident prevention and safety education program with that of similar schools. If different criteria for reporting are used by all schools, school accident data will become meaningless. The Standard Student Accident Report Form is shown in Figure 6:2.

The first and most important step in uniform accident reporting is to determine what accidents to report. It is recommended that the Standard Form be used to record detailed information on:<sup>12</sup>

1. All injuries to students sufficiently serious to require a doctor's care.
2. All injuries that keep a student out of school for half a day or more regardless of where the student was when he was injured—on school property, en route to or from school, or elsewhere.
3. All injuries, however slight, to students while they are under the jurisdiction of the school. (Unless otherwise defined by statute, administrative ruling or court action, students are considered to be under school jurisdiction when on the way to and from school.)

The student accident report form provides convenient means of obtaining the following information: identification of the injured student, description of the accident, nature and degree of injury, part of the body

<sup>12</sup> Francis C. Svare, "What You Should Know About Standard Student Accident Reports" (prelim. ed., rev. no. 3), minn. (Chicago: National Safety Council, n.d.), p. 2.

## STANDARD STUDENT ACCIDENT REPORT FORM

## Part A. Report ALL accidents to Students Occurring Anywhere, Day or Night

1. Name	Home Address					
2. School	Sex M <input type="checkbox"/> F <input type="checkbox"/> Age _____ Grade or classification _____					
3. Time accident occurred	Hour _____ A.M. _____ P.M. Date _____					
4. Place of Accident	School Building <input type="checkbox"/> School Grounds <input type="checkbox"/> To or from School <input type="checkbox"/> Home <input type="checkbox"/> Elsewhere <input type="checkbox"/>					
<b>NATURE OF INJURY</b>	Abrasion	Fracture	<b>DESCRIPTION OF THE ACCIDENT</b> How did accident happen? What was student doing? Where was student? List specifically unsafe acts and unsafe conditions existing. Specify any tool, machine or equipment involved.			
	Amputation	Laceration				
	Asphyxiation	Poisoning				
	Bite	Puncture				
	Bruse	Scalds				
	Burn	Scratches				
	Concussion	Shock (el.)				
	Cut	Sprain				
	Dislocation					
	Other (specify)					
<b>PART OF BODY INJURED</b>	Abdomen	Foot				
	Ankle	Hand				
	Arm	Head				
	Back	Knee				
	Chest	Leg				
	Ear	Mouth				
	Elbow	Nose				
	Eye	Scalp				
	Face	Tooth				
	Finger	Wrist				
Other (specify)						
6. Degree of Injury	Death <input type="checkbox"/> Permanent Impairment <input type="checkbox"/> Temporary Disability <input type="checkbox"/> Nondisabling <input type="checkbox"/>					
7. Total number of days lost from school	(To be filled in when student returns to school)					
<b>Part B. Additional Information on School Jurisdiction Accidents</b>						
8. Teacher in charge when accident occurred (Enter name)	Present at scene of accident. No <input type="checkbox"/> Yes <input type="checkbox"/>					
<b>IMMEDIATE ACTION TAKEN</b>	First-aid treatment	By (Name)				
	Sent to school nurse	By (Name)				
	Sent home	By (Name)				
	Sent to physician	By (Name)				
	Physician's Name					
Sent to hospital	By (Name)					
	Name of hospital					
10. Was a parent or other individual notified? No <input type="checkbox"/> Yes <input type="checkbox"/> When _____ How _____						
Name of individual notified						
By whom? (Enter name)						
11. Witnesses 1. Name _____ Address _____						
2. Name _____ Address _____						
<b>LOCATION</b>	<b>Specify Activity</b>		<b>Specify Activity</b>		<b>Remarks</b>	
	Athletic field		Locker		What recommendations do you have for preventing other accidents of this type?	
	Auditorium		Pool			
	Cafeteria		Sch. grounds			
	Classroom		shop			
	Corridor		Showers			
	Dressing room		Stairs			
	Gymnasium		Toilets and washrooms			
Home Econ.		Other (specify)				
Laboratories						
Signed Principal _____ Teacher _____						

FIGURE 6:2. Standard student accident report form.  
(Courtesy National Safety Council)

injured, and days lost from school. Because of the significant difference in accident involvement of boys and girls, the most recent revision of the standard form provides for separate reporting of accidents by sex. For

accidents in school jurisdiction *only*, it also provides such additional information as: the teacher in charge when the accident occurred, immediate action taken, notification of parent or guardian, locale of accident, and activity in which the injured was participating when hurt. These data are readily recorded by merely marking the appropriate items in the checklist provided on the form. It has been found that a narrative description of the accident alone does not provide sufficiently reliable data for statistical and programming purposes.

#### DISTRIBUTION OF STUDENT ACCIDENT REPORTS

To be most useful, a copy of each student accident report should be placed in the hands of all interested persons. This would include the original, to be filed in the principal's office, and copies to be directed to the safety supervisor or co-ordinator, chief of the medical staff, research and curriculum directors, and the department head in the area where the accident occurred.

For schools participating in the Standard Student Accident Report Program, the National Safety Council will provide the first year's supply of report forms free of charge. The school can then reproduce the forms for its own use in subsequent years or purchase additional supplies from the Council. To participate in the program, the school must submit, annually, a summary of its student accidents on forms provided free of charge by the Council. All summarized student accident reports received by the Council are compiled into a single report for publication in the yearly statistical accident summary, *Accident Facts*. In this way the experience of each reporting school system contributes to a clearer understanding of the scope and characteristics of the student accident problem. Complete information concerning the Standard Student Accident Report System can be obtained from the Council offices in Chicago, or from local chapters of the National Safety Council.

#### USE OF ACCIDENT RECORDS

Accident records and reports serve no useful purpose if they are merely completed and then filed with no further reference. They should be used continuously in many ways. The information contained in these reports is essential in the initial planning, efficient implementation, and later evaluation of an effective school safety program.

Specifically, detailed injury reports gathered by school authorities:

1. Aid in protecting the school personnel and district from unfortunate publicity and from liability suits growing out of student injury cases.
2. Aid in evaluating the relative importance of the various safety areas and the time each merits in the total school safety effort.
3. Suggest modifications in the structure, use, and maintenance of buildings, grounds, and equipment.
4. Suggest curriculum adjustments to meet immediate student needs.
5. Provide significant data for individual student guidance.
6. Give substance to the school administrators' appeals for community support of the school safety program.
7. Aid the school administration in guiding the school safety activities of individual patrons and patrons' groups.

#### EMPLOYEE ACCIDENTS

The employee accident problem should be a part of the total school accident prevention program. This problem is much more important than is generally recognized by many school administrators. Compensation insurance premiums constitute a considerable educational expense that can be reduced through the development of an employee safety program. The Los Angeles City Board of Education has achieved a cost reduction of thousands of dollars annually by developing a staff to deal only with employee safety for both professional and nonprofessional employees. This program is similar in many respects to successful programs of accident prevention conducted by most major industrial plants. Although this experience cannot be reproduced in every school system, there is need for greater attention to employee safety in nearly all districts.

Employee accidents should be reported in the same manner as student accidents. However, the reporting forms used should be those recommended by the insurance carrier, or forms developed to meet individual needs of the particular school district. Just as with student accident reports, the data compiled on employee accidents should provide the basis of an effective accident prevention program.

#### EVALUATION

All aspects of the school safety program must receive both policy and budget approval from the school board. Therefore, the superintendent

should prepare an annual report on school accidents to reveal the nature and scope of the school accident problem. The annual report also should describe the accident prevention activities and safety instruction carried on in the district. Special reports should be prepared as needed to meet emergency conditions. All accident reports should be factual in nature and reflect accurately conditions as they exist in the district. However, every effort should be made to present the facts in the light of needs for program growth to improve the safety conditions in the schools. The annual statistical report becomes the major over-all evaluation used to measure the success of the school safety program. As mentioned previously, these data are utilized also for the purpose of determining desirable program activities and curricular emphasis in relation to needs of the schools in the district.

### SUMMARY

The co-operation of all persons connected with education is necessary to produce a successful safety effort for the benefit of the students enrolled in the nation's schools. The *organizational phase of the safety program* should bring together teachers and other school employees, students, and representatives of community agencies. Then, accepted and proven principles of school administration should be followed in projecting the organizational planning into effective operation. Safety program planning and administration must include both instructional and noninstructional aspects of school activities.

Supervision is an important factor in a successful school safety program. It is desirable to have all responsibility for safety centered in one responsible individual. This person must be given the authority to carry out a safety program and be held accountable for its operation. The school administration should maintain and use an adequate accident reporting system in the district. These records and reports become the means of evaluating the school safety program and of determining needs for future safety activities and instruction in safe living.

### ACTIVITIES

1. Explain the statement, "Organization and administration are separate but closely interrelated functions."
2. Conduct a debate on the question, "Resolved, that safety education should be taught as a separate course in the secondary schools."

3. Prepare a list of duties and activities that would be responsibilities of the school safety supervisor.
4. Visit a school district and study its accident records and reporting system. Prepare a written report of your findings and make an evaluation of the system based upon the recommendations in this chapter.
5. Write to five school districts and request copies of their annual report on student and employee accidents. Evaluate each report in terms of its usefulness in obtaining support of the school board for the safety program.

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# Creating a Safe School Environment

A SAFE SCHOOL ENVIRONMENT is an important part of a total school safety program. Responsibility for environmental safety is pointed out in the statement of principles prepared by the School Plant Planning Committee of the National Safety Council and endorsed by the Association of School Business Officials and the National Council of Schoolhouse Construction.

. . . Any society requiring that children and youth of specified ages attend school is morally, if not legally, responsible for the provision of school plants that are safe, healthful and of the type that will make the maximum contribution to the total educational program.

More specifically the provision of a safe school environment is an inherent demand upon those charged—by custom, regulation or law—with responsibility for the location, planning, construction, equipment and operation of school plants.<sup>1</sup>

Safe practices of students are influenced by factors other than the school plant itself. It has been established that the school is responsible for the child from the time he leaves for school until he returns home. Furthermore, it is obvious that many aspects of life in the home and the entire community are of importance to the safety of school-aged youth. Accident statistics show that school children are injured in the school plant, going to and from school, in the home, and in the community.

<sup>1</sup> Thomas J. Higgins, "A Safe School Environment," *Safety Education*, Feb. 1956, p. 20.

The term, *school environment*, as used here, will include all aspects of school and community life that influence the safety of the school child. How the instructional program in safety education affects the student's safety will be discussed in Chapter 8. This chapter will be concerned with environmental factors concerning child safety as they relate to the school site, the school plant, safety in going to and from school, the safe behavior of nonstudent school personnel, and the community.

## SELECTING SCHOOL SITES

Selection of the school site is an integral part of school plant planning. "School sites should be selected on the basis of definite standards rather than on unguided personal opinions."<sup>2</sup> In the location of new schools, primary consideration must be given to present and future school populations to determine the potential use of school facilities. However, among the additional important factors to be considered is the safety of students and other school personnel. With the continual increase of vehicular traffic, particularly the development of modern freeways and expressways, the traffic problem must receive priority consideration. Sites should be selected so that students will be confronted with the least possible traffic congestion going to and from school. Additional safety factors to be considered are available means of fire protection and the adequacy and convenience of public transportation facilities.

## A SAFE SCHOOL PLANT

The school building and grounds are basic elements in the fashioning of a safe school environment. Because the school administration has control over the location, design, and construction of the buildings and the layout of the school grounds, it has an opportunity to use every possible measure of safety for students, faculty, and other employees. However, maximum provisions for a safe environment come only with specific planning. Precautions should be taken to meet all legal requirements for safety, and provisions must be made to permit the greatest degree of safety in maintenance of buildings and grounds, and in providing the essential services necessary in the operation of the school. It is desirable to consult the safety supervisor in planning new buildings, or to bring in safety specialists for this purpose if there is no safety supervisor in the district.

<sup>2</sup> Henry H. Linn, *School Business Administration* (New York: Ronald, 1956), p. 446.

## SCHOOL BUILDINGS

The construction of new school buildings and the modification of existing structures to meet modern educational needs and to keep pace with the rapid growth of school populations is a major problem facing most school districts in the nation. High costs require that all possible

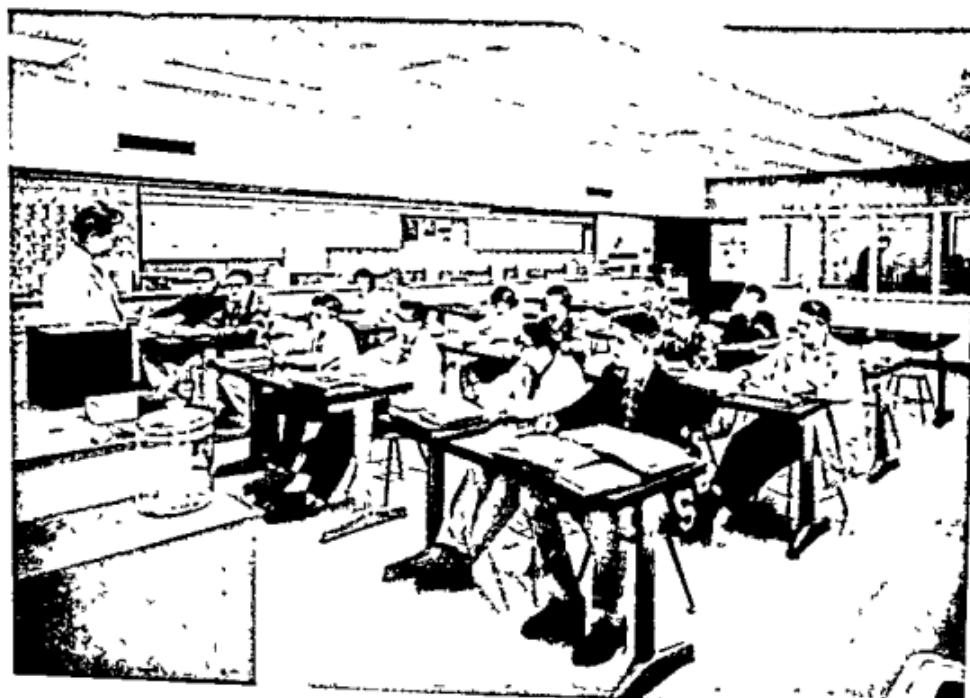


FIGURE 7:1. Clean, orderly, properly lighted classrooms provide a safe learning environment.

(Courtesy Higgins & Root, A.I.A., Architects)

means of economy be used in school construction. However, care must be exercised to ensure that safety and educational efficiency are not sacrificed in the interests of economy alone. "Safety is one of the prime requisites of any school building. No one will disagree with the statement that a school building should be a safe place for children. In the controversy that arises in many communities over construction costs, little thought is given to the possibility that the lives of children may be endangered through the false economy of cheap construction or the continued use of old and obsolete buildings."<sup>3</sup>

<sup>3</sup> William H. Roe, *School Business Management* (New York: McGraw, 1961), p. 192.

New buildings must meet the highest specifications for safety. State and local building codes provide many safeguards that should be rigidly adhered to in all building specifications. Since fire constitutes one of the greatest hazards in school buildings, all precautions should be used to provide for fire protection. Fire-resistant materials should be used, fire walls and fire doors should be included where necessary, appropriate exits should be provided, fire warning and fire-fighting devices should be installed, heating and fuel storage rooms should be properly located and protected, and large assembly rooms should be located on the ground floor. Adequate ventilating systems should also be provided, lighting should meet recommended standards, and appropriate furniture and equipment should be selected for all school buildings.

Maintaining desirable standards for student safety in existing school buildings provides another problem to school administrators. A constant check must be made to see that these buildings do not have faulty heating systems, defective wiring, inadequate exits, and unsafe floor and stair surfaces. It is particularly important that there be adequate fire-warning devices and fire-fighting equipment in older buildings. Exhaustive studies of the subject reveal that, "An automatic sprinkler system, installed throughout the school and coupled with an audible automatic alarm system, is the only device that will provide complete protection."<sup>4</sup> Often it becomes necessary to make substantial building alterations to provide adequate safety measures or to meet changing educational needs. In such cases, it must be determined if alteration of existing buildings will justify the necessary expenditure. One school district recently found that alteration of an existing structure would cost two thirds as much as the construction of a new building. Had this work been done, the altered facilities still would have been housed in a 50-year old building.

#### SAFETY IN BUILDING EVACUATION

Every school building should have a well-developed plan for evacuation in time of fire or other disaster. Since fire officials agree that the greatest degree of protection can be afforded by immediate evacuation of all building personnel, a plan for fire drills should be developed, and numerous practice drills should be conducted during the year. It is desirable for the school administrator to work closely with the fire department

<sup>4</sup> Marshall E. Peterson, "Is Your School Fire-Safe?" *Safety Education*, Apr. 1962, p. 19.

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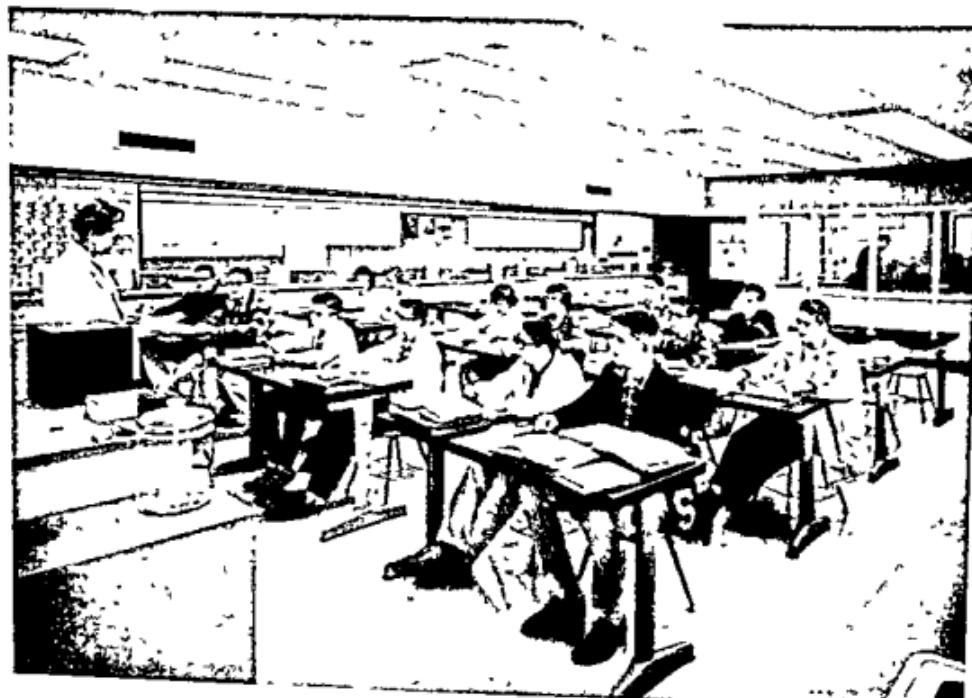


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Maintaining desirable standards for student safety in existing school buildings provides another problem to school administrators. A constant check must be made to see that these buildings do not have faulty heating systems, defective wiring, inadequate exits, and unsafe floor and stair surfaces. It is particularly important that there be adequate fire-warning devices and fire-fighting equipment in older buildings. Exhaustive studies of the subject reveal that, "An automatic sprinkler system, installed throughout the school and coupled with an audible automatic alarm system, is the only device that will provide complete protection."<sup>4</sup> Often it becomes necessary to make substantial building alterations to provide adequate safety measures or to meet changing educational needs. In such cases, it must be determined if alteration of existing buildings will justify the necessary expenditure. One school district recently found that alteration of an existing structure would cost two thirds as much as the construction of a new building. Had this work been done, the altered facilities still would have been housed in a 50-year old building.

#### SAFETY IN BUILDING EVACUATION

Every school building should have a well-developed plan for evacuation in time of fire or other disaster. Since fire officials agree that the greatest degree of protection can be afforded by immediate evacuation of all building personnel, a plan for fire drills should be developed, and numerous practice drills should be conducted during the year. It is desirable for the school administrator to work closely with the fire department

<sup>4</sup> Marshall E. Peterson, "Is Your School Fire-Safe?" *Safety Education*, Apr. 1962, p. 19.

in setting up a fire-drill program. Following are some of the points to consider in conducting fire drills:

1. All school students and employees should be told what to do in case of a fire alarm.
2. Everyone should participate in fire drills regardless of what he is doing.
3. Fire drills should be conducted very near the beginning of the school year.
4. Fire drills should be conducted during assemblies, while classes are passing, and at lunch periods, as well as during regular class periods.
5. Fire drills should not be announced in advance.
6. No one should re-enter the building until an appropriate signal is given.
7. Fire drills should be held under circumstances where an exit is "blocked" and the students must be rerouted to another exit.

In some schools, students are assigned responsibilities in carrying out fire drills. This task is sometimes assigned to the school safety patrol, while in other schools students may be selected for these duties by teachers or administrators. Special responsibilities which might be handled by students during fire or disaster drills should be determined by the administration.

It is recommended that special locations be determined in advance to which students are to be taken in the event of an actual fire. Some schools assign a home, church, store, or other appropriate location for each class. If this procedure is followed, it is desirable for a practice evacuation to these areas to be conducted to prevent possible conflict and confusion in time of a real disaster. It is desirable to have such predetermined personnel distribution centers because a large number of students at the scene of a school fire make it difficult for firemen to carry out their duties safely and efficiently.

#### MAINTAINING SAFETY IN THE SCHOOL PLANT

Proper maintenance of the school plant is a key factor in a school safety program. "A school can be safe today and hazardous tomorrow if maintenance is slipshod."<sup>5</sup> Maintenance refers to the making of repairs or replacements necessary to keep the buildings, equipment, and grounds up to the standards of their original condition of completeness or efficiency.

<sup>5</sup> Stanley Abercrombie, Norman Key, and Melvin E. Engelhardt, "Safety in the School Plant," *The National Elementary Principal*, Sept. 1959, p. 153.

Safety in the operation of the plant is just as important as maintenance. Operation of the plant refers to those housekeeping duties of cleaning, heating, and caring for the school grounds. It does not include repairs. Most operational responsibilities are carried out daily, weekly, monthly, or at other regularly scheduled times.

To provide maximum safety through proper maintenance and operation of the school plant, regular inspections should be conducted by a committee composed of a representative of the administration, the custodian, the safety supervisor, and any other interested persons. Inspection "is an integral part of good management control and should be performed with regularity."<sup>6</sup> Such inspections will reveal the need for repairs or replacements and provide a check to determine if the regular operation and maintenance functions are being performed properly.

### SCHOOL GROUNDS

Approximately one fifth of all school accidents occur on the school grounds. Therefore, it is essential that every possible safety precaution be taken to reduce hazards to children in both organized and unorganized playground activities. There are three important phases of playground safety: layout of the school grounds, playground equipment, and supervision.

The school grounds should be designed in such a manner that the various games and activities will provide as little physical conflict between groups of students as possible. The activities of the various age groups should be conducted separately, and equipment should be used only by the age group for which it is intended. When older students use the slides or other equipment designed for smaller children, they frequently resort to unsafe practices to attract attention. Permitting a mingling of activities of different age groups will create unnecessary hazards, especially for the younger children.

Playground equipment should be selected for appropriate age groups and located in areas where it will be convenient for their exclusive use. "The criterion of safety has emphatic application in the selection of playground equipment."<sup>7</sup>

Supervision is an essential factor in safety everywhere. On the school grounds, where many excited youngsters are "letting off steam" between

<sup>6</sup> Roe, *op. cit.*, p. 216.

<sup>7</sup> Russell E. Wilson and James R. Hood, "Equipment for the Elementary School," *The National Elementary Principal*, Sept. 1959, p. 137.

classes, particular care should be exercised to have adequate supervision at all times. This practice reduces accidents and provides one of the best defenses against negligence in the event an accident should occur. The school safety patrol is sometimes assigned responsibilities in assisting teachers in the supervision of school playground activities.

### GOING SAFELY TO AND FROM SCHOOL

The safety record of children going to and returning from school is very good. As reported in Student Accident Report Summaries, this activity accounts for less than 10 per cent of all school accidents. The good record in this area is due largely to the vigorous manner in which the schools have engaged in programs of pupil protection. Since a large percentage of to-and-from-school accidents occur to very young children, special programs of education have been developed for this group. Precautions also have been taken in providing safety in school bus transportation and for the safe loading and unloading of pupils brought to school by parents. Effective bicycle safety programs have been developed for pupils who ride to school. Additional protection has been provided by assigning either school patrols or adult crossing guards to hazardous intersections which school children must cross. All these activities have been important measures for providing a safe environment for school children. However, with a new group of students entering the school each year, a continuous effort must be made to sustain and, if possible, to improve upon this record.

### TRAFFIC SAFETY INSTRUCTION

Special traffic safety instruction for kindergarten and first grade pupils is essential if they are to learn to go to and return from school safely. Most schools place considerable emphasis on this phase of the new pupil's adjustment to the exciting experience of going to school for the first time. This is a definite responsibility of the school.

Teachers should help the students plan the safest route to school. This can be done by constructing a large map of the area surrounding the school, or by having the children build a model of the community. Students also should be given maps of the community upon which they can locate their own homes and draw in the safest way to school. They should

select the route with the least traffic and take advantage of streets with stop lights and stop signs. If there are crossings protected by school traffic patrols or adult crossing guards, the route to school should lead through them. After the student and teacher select the safest route, the map should be sent home to be studied by the parent. It then should be signed and returned to the teacher. In this way the co-operative efforts of teachers and parents can be used to influence students to use the safest routes to school.

Instruction and actual practice should be given to the class in crossing various types of intersections. For many of the new students this will be the first time that they have traveled very far from home without the supervision of a parent or other adult. If the teacher takes the class on a walking tour of the school community, she can give them experience in crossing properly at various types of intersections. If possible, a police officer should accompany the class on this trip to give the students needed instruction and to encourage them to look to him as a person to help and protect them. Such experiences also will make safer pedestrians of the students at times when they are in other areas and are not under the jurisdiction of the schools.

Many school districts have developed specific programs to meet the need of new students. In Topeka, Kansas, a "Kindergarten Safety Round-Up" is conducted prior to the opening of school each year. This program, jointly sponsored by the schools, the PTA, and the police department, brings the new student and his parents to school prior to the beginning of the term. They are given traffic safety instruction by both teachers and police officers. In Greenwich, Connecticut, the schools sponsor a safety indoctrination program for mothers of prospective kindergarten pupils. In Oklahoma City, a general "back-to-school" safety program is conducted which is a combination of instruction for students and education for motorists in the community. Many school and community agencies co-operate in this activity. Similar "back-to-school" campaigns are conducted in numerous other communities. These campaigns have been supported on a national basis by the National Safety Council, the American Automobile Association, and other organizations. The AAA provides back-to-school safety posters that are exhibited each fall in many cities in the nation. Through the co-operative efforts of schools and community agencies, many of these traffic safety programs have become important factors in providing a safer environment for school children.

## BUS AND AUTO LOADING AND UNLOADING

Since so many students travel to school in buses and private cars, it is necessary for the school to make provisions for safe loading and unloading of passengers. This problem is usually solved in the planning of new school plants by providing adequate off-street parking and passenger loading facilities for both buses and cars. However, in older schools, particularly where formerly quiet residential streets have become heavily traveled thoroughfares, this is more difficult.

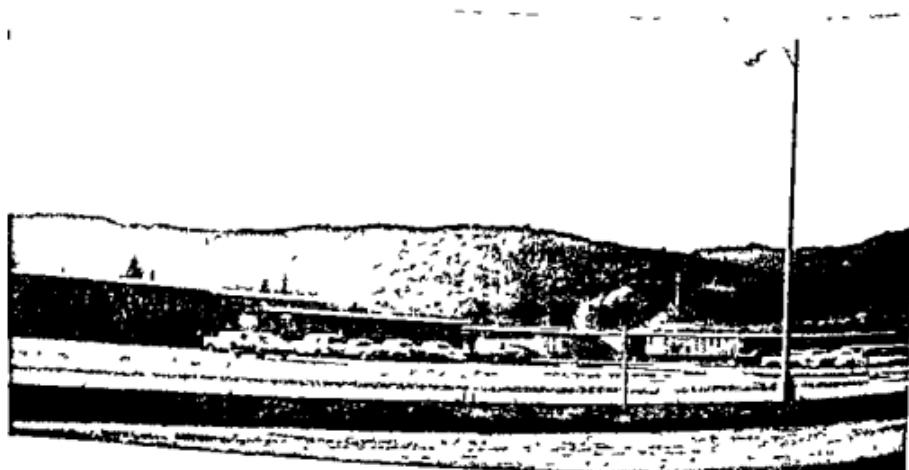


FIGURE 7:2. The safe school plant should provide adequate parking facilities, an area for loading and unloading bus students, and pickup and delivery points for parents who transport students in private cars.

(Courtesy Higgins & Root, A.I.A., Architects)

School buses should have regular stalls for loading and unloading students, and supervision should be provided. School safety patrols have been effective in the supervision of loading school buses in many districts. Where many pupils are picked up on the streets by parents, there should be an educational program for the parents to encourage use of safe practices in performing this operation. Any program of passenger loading should include instruction to students to prevent running between cars or jaywalking across busy streets.

## BICYCLE SAFETY

A look at almost any elementary school ground, while school is in session, will reveal the fact that thousands of youngsters travel to and from school on bicycles. To ensure the necessary degree of safety in the total school environment, it then becomes a responsibility of the schools to develop a bicycle safety program that will provide for safety on the school grounds and educational experience in the proper care and operation of bicycles for school children when riding to school.

Bicycle safety on the school grounds is relatively simple to achieve. First, there should be a specific and rigidly enforced rule that forbids bicycle riding on school grounds. This rule must apply to all school employees as well as students, if it is to be effective. Second, adequate storage racks should be made available so that the students will have a place to park their bicycles safely and conveniently. Having bicycles lying on the school grounds in a disorderly fashion creates hazards that can lead to serious accidents. In some schools the pupil turns his bicycle over to a safety patrol member who parks it for him.

Instruction in the proper care and use of bicycles is a more difficult problem. The fact that, in an average year, cyclists have nearly 500 fatalities and over 25,000 disabling injuries is ample evidence that more needs to be done to control this problem. Since approximately four out of five of the bicycle victims are between the ages of 5 and 15 years of age, it is apparent that the need for such instruction is vital in the elementary schools.

Because so little was known about the factors or circumstances of bicycle accidents, other than the number of dead and injured in various age groups, the National Safety Council conducted a study of the bicycle accident problem in 1957. Forty-two states co-operated in the survey. The following findings of the study provide an important point of departure in the development of a school bicycle safety program.<sup>5</sup>

1. Riding on the left side of the street is more hazardous than riding on the right side.
2. Eighty-four per cent of the victims were under 16 years of age.
3. Eighty-six per cent were males.
4. Seven out of 10 accidents occurred during April through September.
5. Seven out of 10 occurred during daylight hours.

<sup>5</sup> "Bicycle Accident Statistics," *Safety Education*, Jan. 1959, p. 6.

6. Four out of five occurred during p.m. hours.
7. Accidents were more frequent on Saturdays, least frequent on Sundays.
8. In one out of three accidents, the bicyclist struck the motor vehicle.
9. In four out of five accidents, the bicycle rider was violating the rules.

Due to the instruction given in many good bicycle safety programs at schools, there has been a considerable reduction in the number of fatalities and injuries during recent years. For a number of years fatalities averaged around 700 a year, with a high of about 900 in 1941.

The bicycle safety programs conducted in many of the schools usually consist of a number of tests to determine: (1) the condition of the vehicle, (2) the riding skills of the student, and (3) the knowledge the student possesses concerning the rules of the road and safe riding practices. The bicycle inspection tests determine the condition of brakes, lights and reflectors, warning devices, tires, handle bars, saddle, crank assembly, frame and fenders, and other factors such as general cleanliness and lubrication. The skill tests determine the student's ability to balance at slow speeds, steer, ride in circles, maneuver the bicycle, and brake safely. The knowledge tests are quite similar in content to knowledge tests for motor vehicle operators. They determine the student's knowledge of rules governing the operation of a bicycle and safe riding practices. These knowledge tests are important because, as in motor vehicle accidents, more than 80 per cent of the riders involved in accidents are violating rules of the road pertaining to cyclists.

There are many agencies, both public and private, that co-operate extensively in school bicycle safety programs. These include safety councils, insurance agents and companies, civic and service clubs, PTA groups, police departments, and many others. Information concerning the development of a school bicycle safety program and testing materials for use in the program can be obtained from the American Automobile Association, the Bicycle Institute of America, the National Commission on Safety Education, the National Safety Council, and other organizations.

Some schools have inaugurated, as one part of their bicycle safety program, a bicycle court. Bicycle accidents in Norwood, Ohio, were reduced more than 50 per cent following the establishment of such a court. In such a program, violators are cited to appear in a court presided over by their peers. Cases are pleaded and penalties are assessed in keeping with the violation. This usually involves the writing of an essay on bicycle safety, although chronic violators may be referred to the juvenile court and may have their bicycles impounded by the police department for several weeks.

### ADULT CROSSING GUARDS

Adult crossing guards are employed in a large number of school districts to protect elementary school children who must cross hazardous intersections on their way to and from school. It is felt by many educators and traffic police officials that intersections with a sufficient volume of vehicular traffic and school children pedestrians to require special protective measures are so dangerous that this responsibility should be placed in the hands of adults. They prefer adult crossing guards to student patrols, even though the patrols are properly trained and closely supervised.

Safety of school children is the primary purpose of providing crossing guards. However, the element of cost is an important factor in determining the type of crossing protection program to be used. The use of regular uniformed officers for this purpose is very costly and removes needed patrolmen from normal police duties of crime prevention. This is the primary reason why many cities have employed a special detail of civilian crossing guards for the sole purpose of protection at school crossings.

There is about an even distribution of retired men and young mothers who have assumed the responsibilities of civilian school crossing guards. Both groups have done a very satisfactory job of providing the necessary degree of safety for school children. It is customary for crossing guards to be paid for their services but, since their rate of pay is less than for regular police officers, employing this special group results in an economic saving. In cities where the crossing guard personnel is made up of volunteers, it is usually composed of mothers who have a vital interest in the protection of their own children, as well as other children in the community.

The following are recommended practices in the establishment and operation of a civilian adult school crossing guard program:

1. The program should be worked out co-operatively by the schools and the police department.
2. Applicants for crossing guards should be carefully screened to make sure that they meet the physical and moral qualifications to perform their duties in the protection of school children.
3. There should be a program of training which would include instruction in traffic control, traffic regulations, child psychology, and first aid.
4. New crossing guards should perform their duties for at least one day under the direct supervision of a regular police officer. Following this indoctrination period, the crossing guards should be supervised continuously by the police department.

5. Crossing guards should wear some identification, such as uniforms, caps, jackets, and badges so they will be readily recognized by both school children and motorists.
6. Policy should be established regarding the jurisdiction of crossing guards. Their primary function is to escort children safely across the street and they should direct traffic only when necessary to safeguard children. However, civilian crossing guards are sometimes given power to issue citations to motorists for traffic violations. The guards should stand on the sidewalk when not escorting children across the street.

### SAFETY PATROLS

The most widely used means of protection at school crossings is the safety patrol. "The School Safety Patrol is an organization of selected boys and girls from the upper elementary grades and junior high school who help schoolmates to avoid street traffic accidents.

"Fundamentally, the Patrol member's job is *to remind children of safety rules learned in the classroom* and to see that they cross the street only when there is a sufficient lull in traffic so that they may cross in safety."<sup>9</sup>

Safety patrols have been in operation in schools of the nation for over 30 years. Since there are more than 700,000 school children participating in patrol activities annually in thousands of schools across the country, it must be considered an important aspect of the problem of creating a safe school environment. However, the use of patrols for the protection of students at school crossings is still a very controversial issue. Proponents of the program point out the excellent safety record at intersections controlled by patrols and the reduction of pedestrian fatalities since the inception of the program, even in the face of the rapid increase in the volume of motor vehicle traffic. They also cite the exemplary conduct of patrol members and the fact that patrol members rarely develop undesirable records of juvenile delinquency. Safety patrol participation is apparently desirable training for future responsibility of good citizenship.

Those persons who oppose the school patrol program contend that intersections sufficiently hazardous to require control should be under the supervision of adults whose experience and judgment are more mature than that of elementary school youth. Some persons contend that the

<sup>9</sup> American Automobile Association, *Safety Patrol Handbook*, first rev. ed. (Washington: The Association, 1960), p. 11.

patrols offer protection as a substitute for education so that children develop a dependence on direction rather than an independence and sense of responsibility for their personal safety. It is contended also that the authority vested in patrol members creates psychological maladjustments for both patrol members and those students under their protection.

The specific functions that are to be performed by the patrol are also a matter of controversy. Some school districts permit patrol members to stop traffic to permit students to cross streets, but in the vast majority of cases patrols direct only the actions of students. It is generally accepted that,

The functions of the school safety patrol are to instruct, direct, and control the members of the student body in crossing the streets and highways at or near schools; and to assist teachers and parents in the instruction of school children in safe pedestrian practices at all times and places. Patrols should not be charged with the responsibility of directing vehicular traffic, nor should they be allowed to direct it. They should not function as police.<sup>10</sup>

School safety patrols often are given responsibilities other than traffic safety. They may monitor halls, assist in the school bus safety program, assist teachers in playground supervision, and perform supervisory functions at many school activities. Because of the diverse nature of school patrol functions, it becomes the responsibility of the school administration to determine how the patrol should operate in a given district.

There are many organizations that participate in school patrol activities. Further information concerning the patrol program can be obtained from the American Automobile Association, the National Commission on Safety Education, and the National Safety Council.

#### SAFE BEHAVIOR OF SCHOOL PERSONNEL

The school environment can be only as safe as the conduct of the persons within the environment. Safe practices in all school activities become the responsibility of students, teachers, and all other school personnel. Supervision, too, becomes a responsibility of school administration and staff if a safe environment is to be maintained.

Good housekeeping practices have been established as important factors in creating a safe environment. Teachers should keep their desks,

<sup>10</sup> National Safety Council, *Policies and Practices for School Safety Patrols* (Chicago: The Council, Sept. 1958), p. 3.

storage places, and rooms in a clean and orderly condition at all times. This provides an environment clear of hazards, sets a good example for students, and establishes a climate of *safety* within the school. Teachers must practice safety at all times in their own conduct and in the operation of pupil activities.

The administration must establish safety as a stated objective of the school program and make it an important school function. Recognition for good safety records of both classes and individual students can be made in many ways to promote a good attitude toward safe behavior. Disciplinary action should be taken against those persons who, through their conduct, endanger the physical well-being of others. Supervision is a key factor in safety everywhere. The supervision of student activities should have as a major objective the safe behavior of students.

Students have a responsibility for keeping the school grounds and buildings clean and orderly at all times. Equipment, clothes, bicycles, and other objects should not be left in places where they will become hazards. Equipment and materials should always be used in a safe manner, and areas such as halls and rest rooms should not be used as play areas. Students should be co-operative with safety efforts of teachers, safety patrols, bus drivers, and other persons who are dedicated to providing a safe environment in the school situation.

### A SAFE SCHOOL COMMUNITY

Safety is both an individual and a co-operative effort. The individual must be taught to assume the responsibility for his own safe behavior. However, the individual cannot control his environment, he can only learn to adjust to it. The school administration can build and equip safe buildings and provide both supervision and safety instruction, but the effects of school safety education will be minimized if there is no effective safety effort in the community in which the school exists. The home, the church, the PTA, enforcement agencies, fire protection agencies, civic and service organizations, business and industry, the local safety council, and other community organizations must actively participate in a total community safety effort if the influence of the school safety program is to give the most desirable learning experiences to the student. Community agencies can help develop a safe community through a co-operative effort directed toward the elimination of community hazards and providing education in safe practices.

### COMMUNITY AGENCIES

In the discussion on creating a safe school environment it has been pointed out how numerous community agencies have participated in the development of a program of environmental and instructional safety for school children. An effective safety program requires the active participation of all segments of the community. Parents can provide preschool safety education for young children, good examples of safe practices, and a wholesome atmosphere in the home. Police departments can conduct a comprehensive program of traffic safety. Fire departments can provide the necessary fire protection in the community. Industry can create safe working conditions and contribute to the over-all program of community safety. If there is a community safety council, its function can be to co-ordinate all these safety efforts with a strong program of citizen support for the various safety programs by working through women's groups, civic and service clubs, religious groups, youth organizations, media agencies, professional groups, and all other segments of community life.

Such organizations and agencies can give assistance to the school safety program in many ways. They can provide needed leadership, technical knowledge, funds, literature and other materials, and provide resource persons in the conduct of many types of school safety programs and projects.

The schools can point out community safety needs for the protection of school children that can be carried out by agencies and organizations within the community. By creating a school safety committee that includes representatives of community agencies and organizations, these groups can assist materially in the development and conduct of a successful school safety program. Figure 7:3 shows how school and community agencies can work co-operatively in various aspects of the school safety program.

### COMMUNITY HAZARDS

Every community is filled with numerous hazards that represent attractions to the adventuresome minds of youngsters. Street and building construction projects, abandoned wells and mine shafts, lakes, rivers, canals, areas for coasting and ice skating, and other areas where supervision of activities is absent are all potential hazards to the safety of children. Every effort should be made for the prevention of accidents in these places.

### SUGGESTED OUTLINE FOR SCHOOL AND COMMUNITY SAFETY PLANNING

SAFETY AREAS	PROBLEMS	NEEDS	SOURCE OF RESPONSIBILITY
I. Safety laws, Regulations and Adminis- trative Policies	Keeping the schools and community informed on national, state and local laws, policies and regulations by school board and local town ordinance. Interpretation of safety laws.	Publication, model codes, acts, town laws. Statements of policies and rulings by school boards, town councils, rural zoning agencies and other authoritative groups.	School Boards, Superintendent, Architect, School Principals, Custodian, Municipal Government and Appropriate Municipal Departments.
II. School Buildings, Grounds, and Equipment	Safe school planning for buildings and grounds, safety devices, safe placards and warnings. Handling, storage, and use of hazardous equipment.	Safety architectural service, legal council and facilities for well-guarded hazardous equipment.	School Boards, Superintendent, Architect, Super-visor of Transporta-tion or School Principal, Industrial Arts Teachers and Custodians.
III. Getting to and from school, church, store and post office	Hazardous roads, crossroads, bridges, walks and approaches. Standard school bus inspection, maintenance and repair; and qualified and trained drivers, complete accident records.	Route correction detours, and maintenance. Inspection, maintenance, and repair of school buses. Careful selection, training records on school buses and drivers. Police support. Safe ways to school.	Highway Engineers and Maintenance, School Board, Superintendent, Supervisor of School Transportation, Principal Bus Driver, Parents, and Student Patrols, School Pupils and all Local Youth Organizations.
IV. Safety Organization Within School	Determining hazards, potential dangers, and what is needed. How to organize the entire school into co-operative and constant safety activity.	Student safety council. Driver education, clubs, hazard signs, student patrols, fire drills and safety programs.	Principal School Safety Coordinator, Custodian, Student Council, Department Heads, Faculty and Students.
V. Community Relations and Participation	How to create interest, participation and public support.	Safety meeting, literature, press, radio, television support and public support.	School Principal, Safety Committee Chairman, Local Press, School Paper, Local Police, Civic Clubs.
VI. Instruction Programs, Records, Evaluation and Reports	Determine school and community instruction needed, recording and reporting accidents. Comparison of data and publishing reports.	Standard accident reporting system. Keeping of records. Publishing reports and follow-ups.	Principal's office, Committee Secretary, Department Heads, Police, Community Organizations, Health Department.

**FIGURE 7:3. Suggested outline for school and community safety planning.**

(Courtesy National Safety Council)

(Published in *Safety Education*, September, 1956.)

The best type of community safety effort is one which will eliminate hazards wherever possible and provide an organized community recreation program that will permit young people to release their energies through a variety of well-supervised activities. There should be a particular concentration on safety in recreational pursuits during summer vacation months. The home, also, should contribute to child safety by maintaining a safe and well-ordered environment. Schools should emphasize instruction in safe practices in the types of activities that are available for the recreation of the members of the community.

### **SUMMARY**

*It is the responsibility of the school administration to provide a safe environment for the students enrolled in its schools. To do so requires planning for all aspects of the physical plant and facilities and requires all school employees to assume their safety responsibilities. Safety is an important consideration in the selection of school sites, construction and maintenance of school buildings, and the layout, care, and supervision of school grounds.*

The school environment is more than just the physical plant; it is an integral part of the entire community. The school should make provision for the safety of children en route to and from school. It should provide education for safe living that will assist the students in coping with the hazards of their community. Providing safety for school-aged youth should be a co-operative program including the school and numerous interested public and private agencies and organizations.

### **ACTIVITIES**

1. Select a site for a new elementary school in your community. Describe the safety factors that determined the selection of the site.
2. Prepare a sketch of a proposed elementary school plant. Make provision for play areas, student traffic flow, bicycle storage, and loading and unloading of students on buses and other vehicles. Describe the safety factors involved in each of these elements of the school environment.
3. Prepare a debate on the subject, "Resolved, that school crossings should be protected by adult crossing guards."
4. Outline a bicycle safety program for an elementary school. Provide for vehicle inspection, skill tests, and knowledge tests. Describe how each of the tests would be conducted and what resources persons from the community could provide in this activity.

5. Visit a fire department, police department, or other community agency or organization that works co-operatively with the schools in providing a safe school environment for students. Prepare a report outlining how this agency assists the school in its safety program.

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# Safety Education in the School Curriculum

SAFETY EDUCATION has become an accepted part of public school education from kindergarten through college. In elementary education, safety must become part of the curriculum involving the activities of children. Elementary science experiments as well as the physical education and industrial arts activities must be taught with safety as an important objective of the lesson. As the child progresses through school, activities become more complex and safety procedures must parallel similar activities of society.

The need for an organized analysis of safety as it affects the lives of everyone becomes an important consideration as the student nears the end of his compulsory program of education in the secondary schools. This need often is met by a course in safety education. In addition, driver education frequently is integrated with this course, since its primary objective is the development of *safe* drivers. In school districts without semester courses of safety and driver education, these areas are integrated into existing programs of instruction. In studying the role of safety in the school curriculum, the basic theories of learning will be considered, followed by an analysis of how safety education makes a major contribution to the education of children within the framework of this learning process.

## THE LEARNING PROCESS

The basic theories of learning fall into three classifications. Even though each person supplies for himself some variations that make his

particular beliefs all his own, there are still only three basic patterns regarding the nature of the learning process.<sup>1</sup> Each of these theories of learning has implications for the type of subject matter that is to be included in the school curriculum.

### DEVELOPING GENERAL ABILITIES

One concept of learning is that everyone has a general intellectual ability which must be developed and disciplined. Thus, intelligence is a single capacity and can be developed as a whole. This concept is characterized by a belief in the power of mental discipline and general transfer of learning. All that has to be done is to discipline the mind with the right intellectual and abstract ideas and the mental power derived from this study will enable the individual to live successfully in any type of society.

This theory has major implications for selection of the courses constituting the formal school curriculum. In general, the *transmission of the cultural heritage* serves as the basis for selection of subject matter. The subjects that have been traditionally taught will be the subject matter of the curriculum in schools that are organized according to the theory that learning is simply the development of intellectual ability. An organized course in safety education will rarely be found in a curriculum which identifies itself with only this theory of learning.

### DEVELOPING SPECIFIC REACTIONS

A second theory concerning the learning process is based upon the concept that learning has taken place when reactions occur in a specific manner as the result of a specific stimulus. In other words, educators supporting this point of view contend that general intellectual ability does not exist. Learning is acquired when one develops knowledge, habits, skills, and attitudes that are specific in nature. Learning will depend on the readiness of the learner, his attitude toward the specifics to be learned, his willingness to study, and the satisfaction he thereby obtains. The degree to which these conditions are met will determine the success of the learning process. Since general intellectual ability is denied, all learning must be in terms of small and specific bits of knowledge, habits, skills, and attitudes. If the proper subject matter is selected, a student will leave school with specific abilities which he will be able to transfer to new situations as they develop.

<sup>1</sup> Ernest R. Hilgard, *Theories of Learning* (New York: Appleton, 1956).

Traditional subject matter is the basis of the curriculum for schools organized on the theory that learning is accomplished by developing specific reactions to specific stimuli. The learner will not draw upon his own experience but, through drill and memorization, will master the subject matter established for him to learn. Like the theory that learning is the development of a general intellectual ability, the theory of developing specific reactions contends that one learns by taking into the mind certain subject matter that experts say shall be learned. In both concepts the subject matter is quite traditional in nature.

#### DEVELOPING CHANGED BEHAVIOR

The third concept is based upon the belief that all learning comes from the reaction of an individual to the total situation in which he finds himself. Faunce and Clute point out that "the theory of learning most prominently advanced in our time holds that *learning consists of the modification of behavior through experience.*"<sup>2</sup> Experience is the process of man interacting with his environment. From these experiences man gains knowledge and a new behavior pattern.

This theory contends that the nature or quality of the experience is the most important factor in learning; and thus, selecting and guiding experiences are very important in education. If the experience does not have meaning for the learner, that is, move him toward a worth-while goal, little real behavior change will take place. As the learner grows older, he moves from one developmental stage to another and must master certain tasks at each stage if he is to make normal progress in development toward maturity. If this concept of learning as behavioral change is accepted, the school curriculum will be made up of subject matter that meets the basic needs of individuals. These needs may be the personal needs of the learner or the needs of society which influence the learner's experience. Both personal and social needs are used in determining the curriculum of the school. This concept is well summarized by Simpson when he states, "The probable functional usefulness of knowledge and subject matter in identifying and solving personal and group problems form the chief basis for deciding what subject matter to study."<sup>3</sup>

Most schools select organized bodies of subject matter, including the traditional areas, and develop them in a manner which will have meaning

<sup>2</sup> Roland G. Faunce and Morrel J. Clute, *Teaching and Learning in the Junior High School* (San Francisco: Wadsworth, 1961), p. 56.

<sup>3</sup> Ray H. Simpson, *Improving Teaching—Learning Processes* (New York: Longmans, 1953), p. 419.

for their students. The content is associated with the students' daily activities and explains the world around them. School is made meaningful and becomes part of their daily activities rather than a presentation of traditional concepts. Although some critics state that this theory permits the children to dictate what will be studied, the program actually involves a democratic learning process which *permits the teacher to construct* the curriculum around the needs of the student and society.

Safety becomes an important part of the instructional program based on the development of changed behavior. French, in establishing four areas of behavioral competence needed for the maturity of each individual, lists the third as follows, "Maintaining and Improving Physical and Mental Health. Behavioral outcomes to be sought from general education because of the desirability of maintaining personal, mental, and physical health and of developing a healthful and safe environment."<sup>4</sup> Since safety education is basic to the maintenance and improvement of physical and mental health, it must receive important consideration in programs developed within this theory of learning.

### SAFETY—A BASIC SOCIAL NEED

Safety education meets a basic social need of society as it develops an awareness of the role of safe human behavior in the advancement of social and material progress. The introductory chapter to this book showed the extent of the accident problem and identified it as one of the leading unsolved problems of modern society. Through the development of safe habits and attitudes, safety education becomes one of the principal areas which contribute to the reduction of accidents.

Statistics show that accidents are the leading cause of death between the ages of 1 and 36. This fact becomes even more important when the reasons for many of these deaths are analyzed. While it is impossible to identify a single cause of accidental death among children and young adults, two contributing reasons can be quickly named. They are (1) lack of knowledge and ability, and (2) lack of socially acceptable patterns of behavior. Young children are often injured and killed because they did not know how to avoid an accident. The infant grabbing a bare wire and electrocuting himself, the child lighting a match or fire improperly and burning himself, the elementary school child losing control of his bicycle

<sup>4</sup> Will French and Associates, *Behavioral Goals of General Education in High School* (New York: Russell Sage Foundation, 1957), p. 88.

and running into the path of a car, the junior high student constructing a rocket which explodes in the home, are all examples of the lack of knowledge or ability causing accidents. In addition, the lack of socially acceptable patterns of behavior has been named as one of the leading causes of teen-age automobile accidents.

Education is in a position to help eliminate both of these causes of accidents. The schools provide for all the children and are able to join the home, the church, and the community in providing instruction which will lead to the safe behavior of children. No single agency can be completely responsible. However, since a major number of accidental deaths can be attributed to a lack of knowledge of *improper behavior patterns*, the school *must* accept part of the responsibility. Planned programs of safety instruction can provide the necessary knowledge and initiate responses which will eventually lead to socially acceptable patterns of behavior.

### **BASIS FOR SAFETY EDUCATION**

Since there is no single basis for the establishment of a successful program of safety education, it is necessary to consider all the factors that are involved. These factors include needs, interests, aims, activities, course of study, school district administration, and a good environment for instruction.

#### **NEEDS**

There are three types of needs important to programs of safety education. First, adults see certain needs of a child which must be met in order to live safely in society. Second, there are certain needs which the young person feels must be satisfied in order for him to fit into his environment. Third, he has certain social-personal needs of a psychological nature that must be met. Various needs may be identified by conducting a study of the growth and development pattern of children and youth, by making an analysis of conditions, or by asking young people about their needs.

These three types of needs affect the nature of the safety education program. If the program is based on needs as seen by adults, it will be centered about the needs of children as viewed by an adult. This procedure often fails to identify the real problem. In a sense, the second type of need is psychological. When used as the basis for establishing a safety

program, the result is a child-centered situation. The third type of need is a combination of the first two types and, if broken into two areas of personal and social needs, can be used most satisfactorily as the working basis in establishing a safety education program. Such a program should be suitable for the view of both adults and children.

### INTERESTS

Interests may be identified as a means of motivation, as a goal of education, and as a basis for the selection of curriculum content. For the purpose of establishing safety in the curriculum, some educators would base all content on the interests of the children. When this is done, a child-centered safety program results. Since the interests of children often omit real and potential hazards surrounding them, it is a responsibility of the teacher to show how these hazards can affect them. The teacher must direct and develop student interest in this direction. Leonard feels that, "There must be an inner motive based upon identification of the self with the activity or experience if learning is to proceed satisfactorily; individuals need to have life-long sustaining interests which give them pleasure and foster their growth and development; and the curriculum must use the interests which the learner has developed."<sup>5</sup>

### AIMS

The establishment of a set of aims is the most important part of course planning. These aims describe the planned accomplishments of the course and identify what the instructor plans to accomplish during the semester. They identify the unique contribution of the course in the education of the student and justify the very existence of the course.

The planning of the entire course of study must be developed with the course aims in mind. For example, safety education course aims might include four or five statements identifying the course as one which is planned to:

1. Develop an understanding of the scope and nature of the accident problem in the nation, state, and community.
2. Identify ways in which each citizen can combat accidents.
3. Develop patterns of behavior which will lead to the development of socially acceptable habits and attitudes.

<sup>5</sup> J. Paul Leonard, *Developing the Secondary School Curriculum* (New York: Holt, 1953), p. 92.

4. Provide experience in the solving of typical safety problems facing society.
5. Provide the basis for the integration of safety into an individual's value structure.

Course content, methods of instruction and evaluation procedures must all be planned to fulfill the course aims and evaluate the extent to which the course has fulfilled them. As a result, the careful selection of aims will lead to the preparation of a thorough and effective course.

#### **ACTIVITIES**

The selection of activities is important in the establishment of safety in the curriculum. It must be recognized that an activity, whether it be physical or mental, is the means of fulfilling the aims for the course. Activities are not an end in themselves but are the procedures by which learning is accomplished and reinforced. Activities must be chosen which will help fulfill the aims identified in the course of study. Since all people cannot reach the goals for the course by participating in the same activities, a variety of mental and physical activities must be established to provide for individual differences.

In short, a successful program of safety education must meet the personal-social needs of the pupils, must take cognizance of their interests, and must be planned to achieve aims that are meaningful to students and at the same time reach goals that are socially desirable. Without the selection of a variety of activities in which students may participate, the safety program will not be a success. Needs, interests, aims, and activities are all integral parts of a successful learning program in safety education.

#### **COURSE OF STUDY**

The program of safety education can be developed at the national, state, county, and local level. In fact, the safety program in some districts shows evidence of the contribution made by organizations representing each of these levels. In the final analysis the course of study in safety that is actually operative in the classroom must be produced at the local level. It is not the creation of some expert in the central office but is usually developed by the classroom teacher. National, state, county, and district curriculum personnel may serve as consultants. The guides developed in co-operation with various committees may provide valuable information to the teacher.

It is the responsibility of the teacher to develop the course of study used in the classroom. In this way, the teacher has the final decision in identifying course content, teaching methods, and evaluation procedures. Leonard points out that, "Each generation of teachers has fashioned the curriculum upon the goals of society and their prevailing belief in the nature of learning."<sup>6</sup> The teacher, as he identifies the needs of the students, must plan a course of study designed to fulfill the aims established for the course.

A well-organized course of study is absolutely essential for effective teaching. Learning must follow a carefully planned sequence in order to be most effective. In planning this sequence, provision must be made for each learner to gain the necessary experiences and develop the understanding and personal characteristics identified by the course.

Safety may be brought into a course of study as the principle subject, integrated with other content, or correlated with other instructional units. In the elementary schools safety is most often integrated with other subject matter. For example, the safety necessary in the handling of an animal brought into a science class for demonstration would be an integral part of science instruction. Traffic safety may be correlated with the social studies program in the early grades when children often study about life in their community. The treatment of safety as a special course is usually limited to the junior and senior high schools. In these situations, safety is often treated in a single semester course or as a major unit of instruction in a program closely related with safety. In addition, such subjects as industrial arts, home economics, physical education, and science integrate safety instruction into their regular programs.

#### DISTRICT ADMINISTRATIVE RESPONSIBILITIES

There are at least six responsibilities that school districts must meet in an adequate manner if a safety education program of high quality is to be included in the curriculum. They are:

1. The development of a statement of district policies and procedures for handling safety and safety instruction.
2. The selection of a person, trained in safety education, to become responsible for directing and supervising the program.
3. The keeping of adequate accident reports and the use of these in developing the course of study for safety education.

<sup>6</sup> *Ibid*, p. 99

4. The development of an adequate plan for safety instruction.
5. The creation of a safe environment for adults and children while at school.
6. The provision of adequate insurance protection by the agents of the district.

These matters are discussed at length in Chapter 6, but are mentioned to emphasize the district's responsibilities in establishing a successful program of safety education.

#### **A GOOD ENVIRONMENT FOR INSTRUCTION**

Successful safety education in the school curriculum is dependent on the establishment of an environment that is *conducive to good instruction*. This environment must include considerations for both personal and physical factors. The administration of the school district must be made aware of the needs and contribution of safety education if the necessary environmental factors are to become a reality. The creation of this safe environment was thoroughly described in the preceding chapter. It is difficult to overemphasize the importance of a safe school environment in the presentation of a program of safety education.

#### **SAFETY EDUCATION EXPERIENCES**

Some people think of safety education as being the prerogative of the elementary schools. Safety, however, must permeate every level of education. The lower grades initiate the program and establish the foundation for successful safety education in the junior and senior high schools. In the high school, educational activities very closely parallel normal patterns of the adult society. Safe patterns of behavior established in the high school should contribute to the development of habits and attitudes which will in turn contribute to the safety of the person *throughout his adult years*. Safety education must include special provisions for the handicapped as well as the physically normal child.

#### **ELEMENTARY SCHOOL**

Accidents account for over one third of *all* deaths of preschool and school-age children. The educational program of the elementary school must be planned to permit children to gain an understanding of safety

that is consistent with their age and maturity. Russell identifies the role of the elementary school in safety by showing that, as a result of elementary education, children should be able to "realize that accidents are not accidental but result from activities in home, school and elsewhere; understand that accidents are caused by people and that they can be controlled if we know they are caused and if we are willing to help prevent them; realize an individual's moral and social responsibility to prevent accidents to self and others; cooperate with others so these objectives may be achieved."<sup>7</sup>

These aims must be built around the personal-social needs of the children and must be taken into account in planning the program. Young boys and girls are easily tempted to be daring and venturesome. They respond to fatigue, anger, joy, and similar emotions in ways that often lead to accident involvement. Children must learn that *safety promotes happiness—carelessness breeds sorrow*.

Safety education should be an integral part of daily life in elementary school classrooms. Every effort should be made to develop complete integration of safety with all school programs of instruction. When this is not achieved, it is often possible to relate safety lessons with subject matter or a school activity. For example, a special lesson in fire safety might be related to the science lesson on the chemistry of fires. It is not possible for administrators to anticipate everything that children should learn about safe living. They can, however, plan instruction to provide knowledge about activities in which the children are directly involved, and relate this instruction to the many unexpected and unanticipated situations that continually develop.

Traffic safety is of particular importance for elementary school grades. Pedestrian practices will differ from area to area since each school may possess a unique set of traffic problems. However, all programs will contain common elements. For example, each child should learn the safest route between his home and school, places where it is safe to play, and how to practice courtesy and co-operation in using the sidewalks and streets. He must learn what traffic signs, signals, and markings mean, and the rules that must be obeyed in order to walk and ride in safety. The safe operation of a bicycle will certainly be stressed in nearly every elementary school safety program. The elementary school has the responsibility of supplementing home instruction in traffic safety and initiating instruction pertinent to the needs of the children and the community. Each child must

<sup>7</sup> Emerson Russell, "What to Teach When," *Safety Education*, Oct. 1960, p. 6.

be helped to face the variety of traffic situations that he will encounter.

Social studies provide an abundance of opportunity to integrate safety instruction in the elementary school program at each grade level. A study of early man can show how he developed ingenious methods for ensuring his safety. A study of community life can help pupils to understand how man has established the ways and means of protecting himself against accidents. An examination of the growth of our industrial society will illustrate the progress of safety in ensuring the protection of people while they are at work. Knowledge of local, state, and national governmental efforts to ensure the safety of citizens, such as the provision of a program of civil defense, can help boys and girls understand the importance of the contribution made by safety to the improvement of modern living.

The other areas of the elementary school curriculum also contribute opportunities for the integration of important concepts of safety education. Industrial arts experiences, usually related to the social studies in the elementary grades, can help boys and girls acquire knowledge of the safe use of tools and materials. The fine arts present media through which youngsters can express their ideas regarding safety. The language arts, through reading and listening, give children the opportunity to acquire safety information, and through speaking and writing, to organize and express their thoughts about safety. The science and physical education programs must include the teaching of safety as it relates to the activities of these areas. The health education program often contains many units of instruction directly related to the care and protection of the individual. The elementary school curriculum offers numerous opportunities for the integration of safety instruction. Failure to use these opportunities may result in the elementary school's failure to provide instruction in the methods of combating one of our major social problems.

Safety also is learned through a number of important elementary school activities, such as safety councils, safety patrols, school-bus patrols and all school meetings and programs. The safety councils, usually made up of representatives from various homerooms, generally center their attention on safety conditions in and about the buildings. The school safety patrols help children to cross streets in the vicinity of the school. School-bus patrols assist the driver to maintain safe conditions for children who ride to and from school on the bus. Many school districts develop co-operative safety programs with police and fire departments, as well as with other groups interested in safety education. These groups will often prepare appealing shows and programs which stress safe practices. Such

programs can be presented to the elementary school within the area at an auditorium or at large group meetings.

It must be stressed that the elementary school must supplement the home in providing safety instruction for children. Many accidents list mental, emotional, and physical characteristics of children as the principle cause. Personal maladjustment often underlies behavior leading to accidents. However, the social and personal adjustment of children will not eliminate accidents. Even the best-adjusted children must develop a knowledge of safety practices. Safe living is dependent on good personal adjustment and on knowledge. One is not complete without the other.

#### JUNIOR AND SENIOR HIGH SCHOOL

When a boy or girl enters grade seven in a junior high school, he enters a departmentalized or partly departmentalized situation. He leaves the one-teacher classroom and enters a program in which he receives instruction from a number of teachers. Therefore, in grades seven through twelve a student actually has a number of teachers of safety.

High school safety education is more specialized than elementary school programs. The success of this program is dependent on the quality of safety instruction introduced in the elementary school. In many respects the secondary school program of safety is merely an extension of the elementary level. The methods of instruction and objectives of the program must, however, be adjusted to the needs and interests of high school youth.

It is important that at least one area of instruction or one semester be set aside for concentrated study of the accident problem. It seems inconceivable that any school administration could ignore a major problem of the scope and magnitude of accidental deaths and injuries—especially when the school is able to make a major contribution toward its solution. When established, the unit of safety instruction should be designed to provide factual information about the scope and nature of the accident problems with possible solutions, and this should be presented in a manner which will foster safe living in the community.

Every teacher in a junior or senior high school has a responsibility for making a contribution to the success of the safety education offering. The safety program includes experiences in many aspects of education. Certain subjects, such as agriculture, business, health, home economics, industrial education, and physical education lend themselves well to the integration

or correlation of safety learnings. Instruction in these subjects considers actual hazards that are inherent in the courses and makes a contribution to the preparation of youth for meeting dangers faced at home, at work, and outside the classroom. In addition, safety instruction can be integrated into social science, art, science, and the other special programs of the high school curriculum.

An important part of the high school safety education program is the course in driver education. The classroom phase of this program helps young people acquire knowledge and understanding and develops attitudes needed in safe driving. Practice driving, the laboratory portion of the driver education course, must be provided if the learning acquired in the classroom is to be truly meaningful to the students. Traffic safety education in the lower grades, if adequate in quality, provides the foundation for a successful driver education course.

Many schools provide the opportunities for students to gain experiences in working on school and community problems. These activities are either planned as part of a particular course, a special school committee, or developed by the student council or other student groups. When involved with problems of safety, these activities provide an excellent opportunity for safety education of the students involved, as well as the education of all students affected by the activity. It is important when planning these co-curricular safety activities that objectives be defined clearly. "In general, any co-curricular safety education program should develop among high school youth a strong sense of personal and social responsibility for the common welfare through active participation in safety education programs."<sup>8</sup>

#### THE HANDICAPPED

The need for special safety experience in the education of handicapped individuals at all levels, elementary through adult, must be met in all school districts. Safety education for the handicapped often is forgotten. Yet it can be established that the handicapped have unique safety problems and must receive education that will enable them to have better control of themselves in their activities.

The school must help the handicapped person remedy both internal and external factors which will permit him to live his life in comparative

<sup>8</sup> Donald Wood, "Co-Curricular Safety Activities in Secondary Schools," *Safety Education*, Dec. 1958, p. 8.

safety. With respect to internal (within the individual) factors, the handicapped person can be helped to improve his general mobility, his use of visual and auditory perception, his level of knowledge, and his use of skills. External controls include changing the environment in which the handicapped person must live, restricting the contact of the handicapped with the environment, and providing him with aids and devices that will help him compensate for his disability. Actually, when a handicapped child is provided with knowledge about safety and helped to develop necessary safety skills so that he is able to build for himself the kinds of attitudes needed in order to live more safely, the school is modifying internal factors. However at the same time the child is being trained to mediate between internal and external factors. To merely improve external factors will not provide any guarantee of safety for the handicapped unless the internal factors are also remedied.

The three most common categories of handicaps are intellectual impairments, health impairments, and sensory impairments. The type of safety education experiences developed to meet each category of impairment will differ to some extent. But there are similarities in the safety programs for all handicapped children and adults.

For those with intellectual problems the educational program must include systematic and continuous instruction in meeting safety hazards that children normally encounter in their environment. Such pupils will not learn rapidly nor will they retain what has been taught them as well as will children of higher intelligence levels. Thus there is a need for carefully planned repetition in their instructional program. In the case of the severely mentally retarded, there probably will be a need for some environmental restrictions and changes of external factors that may create a hazard with which handicapped of this type cannot learn to cope.

Children with health impairments, particularly those with orthopedic difficulties, have a major problem in moving from place to place with safety. Changing the environment to remove some hazards and providing the handicapped with compensatory aids, such as appliances, are important elements in the safety program for those with health difficulties. In the safety education program, attention must be concentrated on teaching the orthopedic child to fall without injuring himself, to use his appliances safely, and to move in traffic with the maximum of safety. Other health cases, such as those suffering from cardiac ailments, must also be taught how to restrict and regulate contact with their environment.

Sensory impairments, both visual and auditory, create serious safety problems. Those with sight limitations must be taught how to restrict their

activities to those in which they can participate safely. Those who are totally blind must be trained to move safely even though they do not have the benefit of vision. All visually handicapped people can be helped to make greater use of their auditory sense. In contrast, those with auditory problems must learn to rely to a greater extent on the sense of sight. The mobility of the deaf is not as serious a problem as that of the visually handicapped. People who suffer from sensory impairments can be educated to live more safely and are often provided with appliances, such as glasses or hearing aids, that may enable them to compensate almost completely for their handicap.

The general effort in educating handicapped children is in the direction of adjustment to their natural environment. Special considerations must be given the handicapped in order to ensure their safety in the school environment, as well as outside the classroom. Conner lists the following guidelines for maximum safety:

1. Safety provisions and regulations for non-handicapped school children should also apply to the handicapped.
2. Modifications of the environment should be minimal, and removed or revoked as soon as the child can function safely without them.
3. Early encounters with unusual living conditions and first applications of newly learned skills should be introduced with the support and guidance of a competent adult.
4. Since environmental and mechanical factors present many potential hazards, attention to items such as housekeeping and room arrangements are important. Special precautions are necessary in sanitation areas, particularly toilet facilities.
5. Over-protection should be avoided, but the adult needs to be sure that the child knows procedures to be followed in an emergency, senses possible hazards, and is able to develop and utilize alternate solutions.

Patterns of safety depend in large measure on habits and attitudes. Especially important are the body-mind factors that govern a child's adjustment to his handicap. In some measure, disabled children must be taught on an individual basis. Each child's fundamental problems of frustration, overdependence, poor motivation, and inadequate self-concept must be considered in the pursuit of teaching him how to live safely.<sup>9</sup>

#### SAFETY EDUCATION IN VARIOUS SUBJECT FIELDS

Subjects such as agriculture, business, health, home economics, industrial education, science, and physical education must incorporate safety

<sup>9</sup> Frances P. Connor, "Safety Education for the Disabled Child," *Safety Education*, Jan. 1962, p. 25.

concepts into their educational programs. The safety programs of these instructional areas must be integrated or correlated with other school subjects. Other subject areas, as well as extracurricular activities, play an important role in safety education.

#### AGRICULTURAL EDUCATION

In the classification of hazardous industries, agriculture is ranked third behind construction and mining. As described in Chapter 13, fires, power machinery, traffic, poisons, livestock, and ordinary farm tools and equipment play an important role in making farming a dangerous occupation.

Generally, agricultural education is taught under practical conditions utilizing the student's home farm, classroom, agricultural mechanics laboratory, school-district-owned farm, or farms visited on field trips. Education for farm safety is an integrated part of agricultural education and combines individual and group instruction. The time devoted to various experiences will vary from class to class according to the needs of the students. The instructional programs should include a study of combustion, handling explosives, and storing gasoline and other flammable materials. Additional units should emphasize safety in relation to electricity and electrical farm implements, power machinery, and the transportation of farm equipment and personnel. The size of farm machines and the slow speeds at which they must be driven create problems. Poisons, sprays, and chemicals are becoming an item used almost daily on most farms. Their use and storage become more important as these chemicals become more complex and dangerous. Livestock, particularly bulls, always present a danger. Farms are dangerous places with high accident rates. Agricultural education can make a great contribution by incorporating a study of safe living on farms into organized courses of agricultural education.

#### BUSINESS EDUCATION

The business education program must provide safety education as part of its organized curriculum in order to prepare students for their first positions in the business world. This emphasis is necessitated by business's recognition of safety needs. Business teachers must aid students to prepare for their first job by developing in each an understanding of the importance of practicing safety procedures as a means of preventing accidents.

At least three elements must be present in the safety experiences that are included in business education classes. The student must take part in, and understand the need for, keeping the classroom a safe place in which to work. Maintaining the classroom floors, doors, desks, chairs, filing cabinets, and all the equipment used in a business education class in safe condition is important if the student is to be taught how a business establishment should be maintained. As a second element in the program, special attention must be given to teaching the student correct and safe practices in use and care of machines and other equipment. Instruction must stress the safe operation of business machines, proper care of electrical facilities, keeping file drawers closed when not in use, and information of a similar nature that is basic to safe practices in a place of business. The final element is the instruction of students in behavior patterns necessary to promote safety in the office. Girls are taught to wear clothing that does not create a hazard on the job. The danger of wearing certain hair styles which might get caught in office machines should be presented. Safety in the world of business must be taught by keeping the classroom a safe place in which to work, by instructing the student in the methods of handling equipment safely, and in the importance of personal dress and conduct.

#### **HEALTH EDUCATION**

For many years, safety education has been an important phase of the health education program. Many health programs and health education textbooks contain instructional units on safety. In districts which do not offer a separate safety education course, health education is often the only place where safety is discussed as a separate unit. In many districts a single unit of safety instruction in health education has been developed into a semester course. This development often permits both safety education and health education to profit from the individual emphasis placed on each.

Safety, as presented in health education, includes a treatment of the causes and general types of accidents. Often, it is necessary to include the teaching of traffic safety education and to provide time for practice driving lessons. Civil defense education, an increasingly important phase of safety, may also be offered as part of health education. The health class is the logical place to present formal instruction in home, school and community safety when this instruction is not part of a separate course. As

more and more separate safety education offerings are established, the inclusion of safety material in health education will be less necessary, and personnel trained in health will be able to give more time to problems of disease and personal health affecting individuals and communities.

### HOME ECONOMICS EDUCATION

The teachers of home economics rank among the most safety-conscious. The fact that the home is the scene of more disabling injuries than any other location supports the need for safety instruction in this curriculum. Attention is focused on this important area of instruction when it is recognized that the first foundations of the safety education of children are laid in the home.

Typically, home economics, as a separate school subject appears first between grades seven and nine. Safety must be included in this introductory course and must be part of all subsequent courses. Experiences must be provided that will help students understand that home safety is based on knowledge and on positive attitudes toward safety. Such experiences can be included in the seven basic areas of the home economics program. For example, in studying child development, the safety instruction will emphasize factors in the play, environment, feeding, and general care of children. In the area on the family, safety study can stress the importance of proper family attitudes toward safety and of knowledge about community agencies that help families and individuals. A unit on foods and nutrition can cover information on safety in food handling, preparation of foods, and on pure food laws. The work with clothing can include not only safe methods in sewing but also the ways to maintain clothing in a sanitary manner. In studying housing and home furnishing the students can learn the facts about hazards in the home and how to find and eliminate them. Instruction regarding management of the home can include the importance of cleanliness and the proper storage of dangerous objects, as well as information on preparations for meeting disasters if they should occur. Lastly, most home economics programs include the seventh area which covers health and safety in the general home environment.

In teaching safety in home economics, it is important that the classroom environment serve as an example of what a safe home should be like. The teacher should point out the factors in the construction of equipment and maintenance of the room that contribute to safe living. The very

nature of the home economics room should aid the teaching-learning process.

#### INDUSTRIAL EDUCATION

Industrial education teachers include safety instruction in all facets of their education program. Instructors in this area must teach students to recognize industrial hazards, think clearly while working with tools and equipment, and practice safety procedures in industrial as well as every-



FIGURE 8:1. Safe facilities are necessary to develop a creative and educational environment in industrial arts laboratories.

(Courtesy San Jose State College)

day activities. Safety instruction is a required part of all industrial education.

The first industrial arts experiences (the general education phase of industrial education) in the elementary school involves the use of simple

hand tools. As the student advances, he is introduced to more complex tools and machines. At all stages, safety is a major emphasis. Since the proper use of dangerous equipment involves a major consideration for safety, instruction in procedure and safety are completely integrated in the instructional program. This complete integration is part of normal industrial procedures as well as industrial education. The use of both hand and machine tools has become a part of the daily lives of many homeowners. They either use tools and equipment in maintaining their home or develop one area of industrial arts, often woodworking, into an avocational activity.

High school courses may include study in woodworking, metals and materials technology, automotive and transportation, electricity-electronics, graphic arts, drafting, photography, crafts, and the like. Such courses provide a general understanding of these industrial areas, as well as showing how art and science are applied to industrial processes and materials. Secondary values include applications to home maintenance and may serve as basic instruction for many occupations.

#### PHYSICAL EDUCATION

Over half of all school accidents occur in organized or unorganized games. This fact places a major responsibility for integrated safety instruction on the physical education program. Most physical activities require instruction and practice in order to co-ordinate movement and develop skill. A good physical education teacher ascertains how well a participant can perform the necessary skills before permitting him to partake in the activity, or teaches him the correct procedure for safe participation. Failure to have attained a satisfactory mastery of the skills in relation to the amount of co-ordination required can result in an injury. As in industrial education, safety must be integrated into all phases of the physical education program of instruction.

All sports which involve running and bodily contact, including winter sports, water sports, stunts on mats and apparatus, shooting and competitive sports, have dangerous aspects and can result in accidental injury. In these sports the teacher must instruct students in the proper performance of skills and teach them the rules of the game. Accidents can arise from failure to play in accordance with the established rules. Thus, safety is threatened when a person does not play fair or to the best of his ability.

Pupils should be instructed in the nature and value of wearing pro-

tective equipment and safe clothing while participating in sports. One reason for the number of accidents that occur while children are busy in organized play is the lack of proper protective equipment. During organized play, when the proper equipment is normally provided, accidents are less frequent and, when they do occur, less serious. For example, accidents in sandlot football games often result in serious injury to the participants because the players are wearing inadequate protective equipment or none at all.

The safety phase of the physical education program includes teaching all children certain basic methods of preventing injury. Techniques of falling, lifting, pushing, and pulling in a manner that will prevent injury must be taught at the earliest opportunity. Too often this type of instruction is not received until junior or senior high school. Yet it is important that children have acquired such basic protective skills and be in good physical condition before they participate in various athletic endeavors.

#### OTHER SUBJECT AREAS

Safety instruction is appropriate in all areas of the school curriculum and is required instruction in many of them. Many instructional programs, such as social science and language arts, may use safety topics as instructional units. In this way the many aspects of the accident problem can be explored as an integrated part of the regular school curriculum.

Science education is involved in the use of many dangerous chemicals and complex laboratory apparatus. The creative art areas of fine arts, music, and drama often involve situations in which students may be injured. In all of these situations the teacher must be aware of the possibility of pupil injury and integrate safety instruction into the normal classroom procedure.

#### SPECIAL PROGRAMS OF SAFETY EDUCATION

Traffic safety and driver education, disaster preparedness, fire prevention, and the use of firearms merit special consideration in identifying curriculum needs. These areas may be integrated with other courses or taught as separate subjects. The area of driver education is recommended as a separate course by most safety groups. The importance of these programs to society is continually increasing, and additional study on methods of solving the special problems of each of these areas is continually under way.

## TRAFFIC SAFETY AND DRIVER EDUCATION

The Romans in the height of their glory had traffic problems in their large cities, and traffic has continued to create difficulties down through the centuries. It is only in relatively recent times that the schools have been involved in helping solve the traffic problem that plagues modern society. In 1962, approximately 41,000 people lost their lives in traffic accidents. Education has joined engineering and enforcement in an effort to reduce deaths and injuries on the highways.

The success of the traffic safety education program at any particular grade level is dependent to a great extent upon the quality of the safety program which has preceded it. Preschool safety learning is the result of both direct and vicarious experience. This sets the stage for the elementary safety education program, which in turn prepares students for the junior and senior high school programs of instruction. Driver education constitutes the final stage of traffic safety education in the elementary-secondary school program. The success of the practice driving or laboratory phase of driver education is strongly affected by the caliber of the classroom offering which precedes or accompanies the driving experience.

In the elementary grades, traffic safety will generally be integrated or correlated with the general educational program. The kindergarten teacher builds on the knowledge which the child has acquired before coming to school and emphasizes pedestrian safety. Sometimes it will be necessary to break bad habits before the pupil can be taught to display satisfactory safety behavior as a pedestrian. The teacher of the first graders will have to accept the level of learning of each individual child and help the pupils to progress as far as possible. Each teacher in subsequent grades must do likewise.

In the elementary grades, students are introduced to safety procedures necessary when utilizing wheels as a means of locomotion. Safety with roller skates, scooters, wagons, and bicycles must be given careful treatment. How to ride in safety on school buses and in automobiles must also be part of the program. Throughout the grades the pupils must be helped to acquire knowledge and understanding of basic rules of the road.

In the junior high school years there is a need to review and to add to the knowledge provided in the preceding grades. Pedestrian safety and bicycle safety must be re-emphasized. More information must be supplied regarding the law and rules of the road in driving a car. The junior high

years are not too early for the school to begin to help pupils understand the laws governing the operation of motor vehicles.

The driver education program should be offered to high school students before they reach legal driving age. After completing a driver education course, young people are better able to accept the responsibility for operating a motor vehicle. The complete driver education program consists of classroom and practice driving experience. The classroom phase of driver education is of value in developing knowledge and information about the scope and nature of the traffic problem. In order to re-enforce this learning and provide safe driving experiences under the supervision of a specialist, the practice driving phase must be included. This phase of the program assists in the development of safety information into safe driving habits and attitudes.

The National Conference on High School Driver Education has recommended the inclusion of the following units of instruction in driver education:

1. The motor vehicle in modern life.
2. The driver-physical requirements, attitudes, and social responsibilities.
3. Fundamentals of legal structure and codes related to motor vehicle use.
4. Characteristics of streets and highways as related to efficient driving.
5. Fundamentals of automotive mechanics, including preventive maintenance.
6. Fundamentals of automotive consumer education.
7. Skills of driving.<sup>10</sup>

#### **DISASTER PREPAREDNESS**

Disaster preparedness involves the preparation of students to meet both man-made and natural disasters. These disasters include enemy attack, floods, windstorms, and earthquakes. Any of these can lead to the need for emergency shelter, mass feeding, care of the ill and injured, communication and transportation problems, or enforcement of the law. A trained civilian population is needed for all these emergencies. Safety education has the responsibility to provide an educated citizenry prepared to meet the demands created by any type of disaster.

<sup>10</sup> National Commission on Safety Education, *High School Driver Education, Policies and Recommendations* (Washington: National Education Association, 1950), pp. 20-23.

The location of a community will determine to some extent the emphasis that civil defense or disaster preparedness drill will take. If located in a bombing target area or where some force of nature poses a potential threat, the drill may be planned to facilitate the orderly movement of the population to some type of shelter. On the other hand, the location may indicate that evacuation is the most feasible procedure. In some communities it will be wise to have people educated in both the processes of removal to shelters and in evacuation procedures.

Regardless of location, every school district should plan for incorporating needed civil defense experiences. These plans should be kept within the maturity level of the students. Such educational experiences include:

1. Personal hygiene under difficult conditions.
2. First aid and care of the ill.
3. Appropriate clothing and shelter.
4. Physical conditioning.
5. Leadership and group co-operation.
6. Actions of a group under stress.
7. Map reading.
8. Emergency supplies of food.
9. Organizations that will assist in times of disaster.
10. Protection against chemical, biological, and radioactive materials, and the means of decontamination of affected areas.
11. Use of tools and maintenance of vehicles.
12. Operation, maintenance and repair of communication devices.

#### FIRE PREVENTION

The discovery of fire has contributed to the development of modern society. However the prevention of unwanted fires demands man's constant attention. The schools must provide education for the prevention of fires, thereby contributing to the solution of this problem. In many states, fire prevention instruction is compulsory.

In this educational program every grade and every teacher can play a part. The course of study can be planned to meet the needs and level of understanding of children and adults alike. In presenting this program, everyone can be helped to understand the cause and origin of fires, the danger of carelessness and neglect as related to the possibility of fire damage, the importance of care in using fire, and the necessity for every-

one to have an interest in the prevention of fires. A sequential program of fire prevention can be developed which will continue through all grades of school.

In secondary schools there are many opportunities for including fire prevention in the various subjects. In social science, topics dealing with the social and economic effects of fire can be included. In science a study of the facts concerning heat, spontaneous combustion, and the chemical and physical means for controlling fires can be included. Industrial education, home economics, and health education courses can all include worth-while lessons about fire prevention.

The need for maintaining a safe school environment in which to provide instruction in fire prevention cannot be overemphasized. Regular inspections of the school plant and immediate attention to correcting any fire hazards found are necessary to the success of a program of fire prevention. Proper attitudes toward the importance of preventing fires are taught best in an environment that can serve as a model for safe practices.

#### **USE OF FIREARMS**

A citizen of the United States has the constitutional right to keep and bear arms. With this right goes the implied responsibility to use his firearms in a safe manner. There was a time in our early history when a gun was indispensable in everyday living. Today it is primarily a piece of recreational equipment. With the growth of population and the urbanization of the people, the recreational use of guns must be controlled. The safety of young and old alike is dependent on proper, intelligent use of firearms.

The proper use of firearms can be promoted through education in the schools. Young children must be taught that playing with guns is dangerous both to themselves and others. Older children can be instructed in how to handle a gun safely. Camping programs which include classes in science and conservation are offered by elementary schools. A unit on safety in the use of firearms can be included in these programs. The physical education program in secondary schools also may offer experiences in target shooting and firearms safety.

#### **SUMMARY**

Safety education is one of the main avenues which must be used to combat the growing accident problem. In formal education, safety has

developed and established a position within the educational framework of behavioral change. In programs which subscribe to the belief that learning is the perfection of general or specific abilities, safety has serious difficulty in being established as a separate program of instruction. Most research studies verify the belief that learning must involve the changing of behavior patterns.

Many factors are involved in the development of a successful school safety program. Personal and social needs, children's interests, and course aims all control the selection of activities and the development of a course of study. In addition, school districts must meet their administrative responsibilities in an adequate manner if a high-quality safety education program is to be established. Finally, a good environment that considers both personnel and physical factors must be established if the safety education program is to be successful.

Safety education must be included at all levels of instruction and for all students. Education is begun in elementary schools and continued throughout all formal education. Special consideration must be given to the safety of physically and mentally handicapped students. At the same time, safety must be an integrated part of many instructional programs. Agricultural, business, health, home economics, industrial education, science and physical education require the inclusion of many safety concepts and activities. Special areas such as traffic safety, disaster preparedness, fire prevention, and the safe use of firearms must be given a place in the safety education program of the schools.

## ACTIVITIES

1. Prepare a set of course aims for a special course or unit of instruction in: (a) driver education, (b) firearms safety, (c) fire prevention, (d) disaster preparedness, (e) general safety education.
2. Select an area of education normally conducted in the school (e.g., physical education, science, industrial arts) and outline the different ways in which safety education is integrated into the instructional program.
3. Plan a panel discussion which will identify the role which safety education could play in each of the three theories of learning presented in this chapter.
4. Visit a school in your district and identify the special provisions the school has made for: (a) safety of handicapped children, (b) safety in

unorganized games, (c) safety while changing classes or during school dismissal.

5. Visit a curriculum co-ordinator in your local elementary school district. Determine how safety is included in the curriculum. Prepare a complete report showing the different methods used by the school district in providing for the safety education of elementary school children.

6. Review courses of study and safety guides found in the library. These guides are usually developed by teacher groups under the direction of a supervisor or curriculum co-ordinator.

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## Methods of Instruction

THE DIVERSIFICATION of safety education content permits the use of a wide variety of teaching methods. The success of a safety program is dependent upon the selection of the proper methods of instruction, and the application of these methods to the fullest advantage. The best course outline and *program organization* are of little value if the teacher is not equipped to present the course in a motivating and educational manner. The methods must include a consideration of the psychological background of the students. That is, their level of motivation, ability, and general interest as well as the physical environment (lighting, ventilation, and so on) must be considered when selecting the proper method for an instructional unit. If these factors are not considered and the method of instruction not carefully selected, the course's content will be presented to the students in a manner which may fail to motivate them or be too difficult or vague for them to comprehend.

Teaching methods contribute to the learning situation in two ways. First, they provide the means whereby a teacher is able to convey the course content to the class members, thereby fulfilling the objectives of the course. This is the most important reason for professional education courses including a thorough study of teaching methods. Without such knowledge, instructional content often would be presented in a haphazard and ineffective manner.

The second way in which teaching methods contribute to the learning situation relates to the direct fulfillment of aims. That is, the teaching method itself fulfills one of the course aims. For example, self-study methods are important in providing students with learning experiences

while at home and also to teach them how to study by themselves. Many educators believe this second function of teaching methods is more important than the first. This function provides for future learning of concepts and facts not presently known. In this age of *growth in technical and social knowledge*, the capacity for self-learning is important for everyone. A second example is problem solving. Many areas of instruction such as science and industrial arts place a major emphasis on problem-solving activities. It is important that the student learn the method—the procedure of problem solving—as well as the answer to the particular problem. This teaching procedure is similar to research methods. As a result, problem-solving procedures will be valuable tools for every student who learns them. Actually, problem-solving methods are more stable than course content, which can become obsolete and irrelevant in a short period of time.

This chapter is designed to show how the instructional program described in the previous chapter is implemented in the classroom situation. While specific emphasis is placed on the formal classroom situation, application of teaching methods can be made to a wide variety of adult and public information programs. This is especially true for the safety programs for adults, described in Chapter 18.

### PSYCHOLOGICAL CONSIDERATIONS FOR LEARNING

A brief analysis of the learning process must be undertaken before delving into the subject of teaching methods. This analysis will include the principal considerations which must be understood in order to develop and utilize successfully educational methods of instruction. For a thorough analysis of the learning process, the reader is referred to the numerous books on educational psychology.<sup>1</sup>

The factors which have primary effect on learning are of significant importance in this analysis. These include motivation, physical characteristics, and environmental conditions. Each of these makes a major contribution to the learning process.

<sup>1</sup> Glenn Blair, R. Stewart Jones, and Ray Simpson, *Educational Psychology*, 2nd ed. (New York: Macmillan, 1962).

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## MOTIVATION

Motivation is the basis of the learning process. Learning cannot be forced; it must be desired and sought. This desire to learn is expressed through interest in the information and subject matter under study. Interest can be developed through either of the two basic types of motivation.

**INTRINSIC MOTIVATION.** This is learning for the pleasure of learning. The knowledge gained carries its own reward. This form of motivation is the most desirable and the one most often sought. It is based upon the concept that the knowledge gained through the learning process is in itself the reward of learning. The individual seeks knowledge to develop his own understanding of the subject matter and accepts the knowledge gained as the motivating factor. While this is the most desirable form of motivation, it is difficult to foster in the school situation. Actually, one of the objectives of general education is to develop this form of motivation so that the student will continue to increase his understanding of his role in society after finishing his formal education. In practice, however, most educational programs must be based upon more visible and concrete forms of motivation, generally referred to as *extrinsic motivation*.

**EXTRINSIC MOTIVATION.** Extrinsic motivation refers to external stimulation for learning. These sources of motivation are not in themselves part of the learning process. However, they must be built into the learning situation and become a reason or justification for learning the subject matter. These forms of motivation may be introduced by the teacher or may develop from the student's environment and past experiences. They must, however, be basic appeals to the individual and justify and support the learning situation.

The forms of extrinsic motivation of particular value to safety education are the following:

1. Reward and punishment. Unlike the intrinsic form of motivation, the reward must be an external reward. Simple praise and recognition are often sufficient, especially in elementary education. Earning a good grade is often the reward. However, the grade itself is not the reward, but a symbol of accomplishment. The reward may be praise and visual recognition, the path to a future job, monetary gifts from parents, praise from peer groups, fear of punishment for a poor grade, or any of the other forms of motivation. When the grade contains little value for the student, it ceases to be a reward.

Fear of punishment is a negative form of motivation and one which is often held in disrepute by educators. Development of antagonism and resentment toward education and knowledge can easily be formed as a by-product if the punishment is too severe or the threat of punishment held for too long a period of time. In addition, motivation by fear of punishment is opposed to the basic goal of intrinsic motivation. Since the development of intrinsic motivation is in itself a goal of education, fear of punishment should be used only as a temporary motivator and discarded at the first opportunity.

2. Self-preservation. While this form of motivation may have little value for learning in other instructional areas of general education, it is important for safety education. The desire to protect oneself from injury and danger is basic. In adult life, this form of motivation can be modified to provide for the preservation and protection of family and friends. As noted in Chapter 3, an implicit danger exists in using this form of motivation. It implies a concept of *safety from danger*, when the emphasis should be *safety for a complete and productive life*.
3. Social approval. This form of motivation is of particular value in attitude development. As presented in the following section, group action is a principal method of developing socially acceptable attitudes toward safety. In accomplishing this aim of safety education, the value which students place on group membership and social approval by their peer group is of extreme importance.
4. Competition. Individual and group competition can be developed into excellent motivation for learning. However, competition, especially between individuals, can develop resentment, jealousy, and a spirit of excessive rivalry. It must, therefore, be kept within bounds and developed into a healthy and constructive form of competition. Since competition is regarded as one of the principles of a democratic society, it plays an important role in the educational process.

The most desirable form of competition in learning is to compete with oneself for self-improvement. This form of motivation has intrinsic characteristics since it is based on self-competition and the desire to learn one instructional unit better than another.

5. Other extrinsic forms of motivation. These include dominance, leadership, curiosity, knowledge of progress, pride, and construction. These and other motivating factors enter the learning situation and justify the educational process to the student. Care should be taken to make certain that the motivating factors are healthy and will not lead to the development of undesirable behavior patterns.

## PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

The physical structure and abilities of the individual are an important factor in the learning process. Such factors as sight, hearing, and energy levels directly affect the learning process. In addition, malnutrition, fatigue, and the general physical state of the student can make him unresponsive to the learning process. These factors must be modified so that alert and attentive students can approach the learning process in the best physical condition.

In addition, the factors of age and maturation dictate the level and depth of instruction possible. Unfortunately, maturation and mental age are not a direct function of chronological age. As a result, a class assembled by age only will contain a wide variety of mental abilities and levels of maturation. These differences must be considered when planning and developing the instructional program.

The physical plant and student comfort are often ignored when the learning process is considered. However, proper lighting, ventilation, temperature, and humidity are all factors which affect the student's ability to learn. In addition, administrative control of class size to prevent overcrowding can help maintain conditions most favorable to the learning process.

## DISTINCTION BETWEEN TEACHING METHODS, TECHNIQUES, AND AIDS

The terms *methods*, *techniques*, and *aids* will be used continually throughout this chapter. While these terms are sometimes used synonymously or interchangeably, each has a definite meaning and makes an individual contribution to the learning situation.

### TEACHING METHODS

*Teaching methods are the orderly procedures used by teachers to direct learners in developing knowledge and attitudes leading to the fulfillment of the teaching objectives.* In safety education, teaching methods include the traditional methods of lectures, lecture-discussions, visual presentations, directed study, and testing. In addition, many of the methods available but seldom used have unique applications for safety education. These methods include individualized study sheets, group

activities, field trips, guest speakers, panel discussions, conferences, teaching simulators, psychophysical testing, and educational displays.

### TEACHING TECHNIQUES

*Teaching techniques are the special details and refinements of the presentation which the teacher employs to make instruction more meaningful.* Hence, a technique is part of a teaching method and contributes to the effectiveness of instruction. An example of a teaching technique would be the way a teacher improves a driver simulator lesson by stopping the film at an unusually difficult part and showing the class the exact driving maneuver which should be made.

### TEACHING AIDS

*Teaching aids are the special equipment, machines, and devices used to help students understand difficult concepts, gain knowledge of their own abilities, learn and understand course content, and develop interest and motivation for the learning procedure.* Examples of teaching aids used in safety education are displays of industrial safety equipment; operating and/or cutaway fire extinguishers; boating, swimming, skiing, or other recreational equipment; psychophysical testing devices; driving simulators; cutaway models of automobile mechanisms and safety devices for the home (properly constructed electrical cords, safety outlets, and the like).

### FULFILLING COURSE AIMS

Teaching methods, aids, and techniques must be planned to assist in the fulfillment of desired course aims. In order to accomplish this, the basic aims for safety education must be analyzed and the selection of teaching methods determined according to this analysis.

### MODIFICATION AND DEVELOPMENT OF SOCIALLY ACCEPTABLE ATTITUDES

*The principal aim of safety education programs centers around the modification and development of socially acceptable attitudes.* In essence, the role of safety education is to teach accident prevention methods and to instill in people a predisposition and readiness to use these methods to

seek information when situations develop on which they have little or no safety knowledge. Teaching methods, therefore, must be selected to contribute to this primary aim.

Studies have shown that teaching methods which involve group effort and activities contribute to attitude change much more than traditional methods of lecture and teacher-directed activities. These methods involve the student in his immediate society and, if properly handled, bring pressure of peers to bear on the development of acceptable attitudes and the modification of unacceptable ones. However, many instructional units do not lend themselves to group activities. Fundamental and basic information about most subjects is often more effectively taught by lectures, lecture-discussions, self-study or other teaching methods. Fortunately, safety education has many instructional units quite suited for group activities from both a content and teaching method standpoint. For example, a teen-age safety class might be divided into groups to study different aspects of recreational safety. One group may be assigned the responsibility of investigating the hazards of water skiing and the way these hazards can best be minimized. The findings of each group will be presented to the class in the form of a panel report followed by class discussion. Many conditions for attitude change and development are present in this situation.

First, the group is analyzing a problem of direct interest since some members will probably have had experience in the activity, and others will be hopeful of enjoying the sport. Also, the problem is being investigated from a safety point of view, which will generate a prevailing atmosphere of safety during the discussion. Individual members of the group will feel pressure to accept safety procedures since other members of the group appear to be accepting it as evidenced by their active discussion. The verbal discussion of the problem centers about the theme: "How to eliminate accidents, thereby gaining more enjoyment from the sport." Each member finds himself contributing to the theme of the discussion and verbalizing safe behavior. This is the first step toward the development of an acceptable attitude. Under normal conditions, an action of this type would be a response generated by an acceptable attitude toward safety. In other words, a person with an acceptable attitude would react to the problem of safety in water skiing by contributing ideas and suggestions to any discussion of this problem.

In addition to the class activities of discussion and pooling of knowledge, class members will have to seek additional information about the

subject. Such responsibilities as interviewing members of a local water ski club, the Coast Guard Auxiliary, water skiing enthusiasts, or ski equipment salesmen; studying articles and reviewing library materials; studying materials of the local safety council; reviewing safety films and film strips; or investigating different types of water skis and life-saving equipment may be assigned to different class or group members. The results of these individual investigations will be brought to the group for discussion and integrated into their class reports. Again, each of these activities represents a method whereby a safety-conscious person might gain knowledge about water skiing safety before enjoying the sport. These actions again duplicate the actions generated by a socially acceptable attitude and, therefore, lead to the development and reinforcement of this attitude.

This activity can also bring pressure to bear on the person who has socially unacceptable attitudes toward safety. He will find that his *attitude* or *readiness to respond* is different, and that classmates do not agree with him. He will also find that the supports for his attitude are not acceptable to the group. This may in turn result in his beginning to question his own attitude and the beginning of its change to the group standard. In essence, he will begin to accept the prevailing attitude of the group in order to gain acceptance by the group. The desire for group membership is a strong lever in bringing about the acceptance of socially acceptable attitudes.

This last analysis will also help explain why teen-age safety councils are effective in correcting unsafe behavior on school campuses, and also why some councils are ineffective. If the council has been successful in becoming a school group respected by the student population, its action against offenders will bring peer pressure to bear on the offender. He will have to comply with the safety procedures or he will not be accepted by the student population. Since, in most cases the student wishes to be accepted by his peers, he will comply and through continued effort may become a supporter of the council and safety program. If, however, the council is viewed as "faculty dominated" or does not have the respect of the student body, its ability to modify attitudes and control student actions will be limited. The council will be able to enforce regulations only through faculty authority and be no more effective (probably less) than a faculty group. While faculty direction can contribute to the development of attitudes, it is in no way as effective as group action and a self-generated desire to learn about safety procedures.

The effectiveness of the group method is based completely on student

response. If the members are placed in a situation where they can take or demonstrate action regarding safety activities, and if the teacher is sufficiently skilled in guiding the group to these actions and having them accept the actions as their own, they will contribute to their own development of socially acceptable attitudes toward safety. In addition, they will learn specific information about the safety projects being studied, in this case, water skiing, and will learn specific information from the reports of the other groups in the class. Because of their efforts, they will be more receptive to the findings of the other class members. A secondary but important outcome is the knowledge gained in how to investigate and solve a problem. Through the process of gathering and integrating information on water skiing, the individual members of the group gain knowledge about the best and most effective ways of studying a problem. This knowledge can be readily transferred and used in other subjects and for other problems.

If the teacher is not successful in guiding the group to accept the safety atmosphere or accept an action program for safety, the group method will fail to develop or modify attitudes. The use of the group method requires considerable skill on the part of the teacher. Lack of this skill can result in a complete degeneration of the teaching situation, with the possible result of the development of socially unacceptable rather than acceptable attitudes. The group method of instruction should be used only by skilled teachers and only in situations and with problems that lend themselves to this method. When utilized properly, this method can produce the desired outcome of socially acceptable attitudes toward safety.

Other teaching methods used in the presentation of course content can contribute to attitude development. While these methods might be used to fulfill the other objectives of safety education, they will also contribute to the primary objective—attitude development. These methods, coupled with the knowledge developed through the presentation of course content, will support, reinforce, and provide the knowledge necessary for the development of safe behavior patterns.

It is possible to separate teaching methods and course content in relation to fulfilling course aims only in the discussion of teaching procedures. In actual performance, each method coupled with its presentation of course content will contribute to a number of course aims. Each lesson, however, will contribute greater depth to certain aims but possibly contribute little or nothing to others. As each teaching method is developed

in following sections of this chapter, its contribution to course aims will be discussed.

#### INFORMATION LEADING TO PREVENTION OF ACCIDENTS

The development of knowledge about the nature and scope of the accident problem and specific methods of dealing with the problem is an important aim of the school program in safety education. This information will equip the students to respond safely to the many situations they confront. Coupled with an acceptable attitude, information on accident prevention will develop a person into a safety-conscious individual, capable of dealing with the numerous hazards encountered daily and able to live a complete and beneficial life.

There are numerous methods available for presenting this information. That method should be selected which will provide the greatest amount of learning and retention with a minimum investment of time and effort. An important consideration when selecting methods to fulfill this aim is the need for student motivation and the development and retention of interest. This can be accomplished through the selection of a variety of teaching methods, all presented in an enthusiastic manner by the teacher. Variety in teaching methods can prevent boredom and monotony, thereby increasing the retention span of the students. An enthusiastic presentation by the teacher will help develop an enthusiastic response from the students. On the other hand, a class loses interest when the teacher lacks enthusiasm.

Teaching methods particularly suited to the presentation of information leading to the prevention of accidents include:

1. **Visual presentation.** This method includes the use of teaching aids such as motion pictures, film strips, overhead projectors, cutaway models, mock-ups, and driver simulators.
2. **Lecture-discussion.** This method involves the presentation of information through a lecture, plus student discussion using the chalkboard as a teaching aid.
3. **Testing.** Both psychophysical testing and formal content testing procedures will help students gain an understanding of their own limitations and the extent of knowledge gained from the course.
4. **Self-study.** Homework assignments and projects will contribute to the development of depth and understanding of the subject matter.

While these four methods are the principal ones used in the classroom,

other methods can be used to teach particular lessons and to develop variety and interest within the learning process. These include guest speakers, field trips, bulletin board displays and presentations, and individualized instruction sheets.

### PROBLEM-SOLVING METHODS

The final aim to be considered is one in which the teaching method provides the greatest amount of learning, the development of problem-solving abilities. The safety education program must equip each student with the ability to gain further information and efficiently to find the solution to safety problems. While this aim is held for education in general, it must be taught and emphasized whenever the opportunity permits. As a result, safety education is able to make a major contribution to the general education of children.

The learning of problem-solving methods can best be accomplished by experience. Through group activity and the example previously described in the subsection on attitude development, the problem-solving process can be developed, used, and analyzed. In the critique following class reports, the teacher can review these steps with the class and point out how they can be used to solve numerous problems students will encounter in their immediate and future activities.

### METHODS OF PRESENTATION

There are many methods of presenting instructional materials available for the elementary and high school teachers. Naturally, each method has its particular application and is best suited to convey information of a special character and contribute to the fulfillment of certain aims of the course. The following sections will discuss the instructional methods most often used in safety education and, when necessary, illustrate their use and contribution to the school program. In addition, special emphasis will be placed on the teaching aids and devices which are required and which contribute to the particular instructional method.

Safety education is one of the areas which profits from teaching methods involving student activities—learning by doing. However, it is not possible to teach about accidents through direct experience. As a substitute, safety education methods provide *vicarious experiences* to promote this aspect of learning. The methods most suitable for this type of instruction include role playing, visual presentations, and group activities.

## LECTURE

*The lecture is a formal oral presentation to a group of students.* While it is normally used as an oral presentation from prepared notes, it may utilize teaching aids such as a chalk, flannel, magnetic board or various audio-visual aids. The principal advantage of this form of presentation is the large audience possible. While often used in the regular classroom, it is best suited for mass or auditorium presentations.

The lecture method in the hands of a capable speaker is an excellent way to present facts and information to a receptive audience. It can also be used to inspire groups to action programs. The success of this method depends upon the mental state of members of the audience. If they are mature and receptive, it can be very effective. That is why this method is often used in college instruction. However, if the group is not willing to accept the information, more subtle approaches must be used.

Guest speakers often use this method of instruction, thereby being able to reach a large audience. It is usually difficult for guests to use any of the student-participating methods since their time at the school is brief, they are not specially trained for teaching, and they are not familiar with the ability and performance level of the students.

The lecture method makes its major contribution to safety education through the presentation of information leading to the prevention of accidents. It has little effect on attitude change directly. However, since information is a necessary part of attitude development, its contribution to this aim is indirect but important.

The lecture method has its greatest value in college and adult instruction. The retention span of elementary school children is too short and their minds incapable of grasping verbalized concepts. They need activity and involvement programs to develop learning and retention. When followed by small group discussions and used infrequently, the lecture method can make a major contribution to secondary education. Safety should not, however, become an auditorium course since the principal aim, attitude development, will be missed by most of the class, especially those needing it the most.

## LECTURE-DISCUSSION

*This is the principal method of teaching used in public education. It consists of the teacher orally presenting instruction to the class. Class*

*members are encouraged to ask questions and make contributions to the lesson.* They often are questioned by the teacher to determine whether they understand what is being presented and also to help provide motivation for attention and learning.

The teacher often will use the chalkboard to illustrate, emphasize, and review. Proper use of the chalkboard requires clear handwriting, good spelling, and sketching ability. An understanding of how to draw stick-figures and make simple sketches will be extremely valuable to the elementary and secondary school teachers. This method is often combined with one of the visual aids described in the following sections to provide a visual presentation to the class. It is by far the most popular method of teaching and, in many situations, is the only method of instruction employed.

The principal advantages of the lecture-discussion method are its adaptability to most teaching situations and its ease of use. It can be used to teach factual information as well as technical, scientific, and social studies. Complete class control is easy to maintain since all discussion centers about the teacher. It is not used as successfully in the development of attitudes as group action, but it does provide for a major contribution through the presentation of factual information and accident-prevention procedures. This information is necessary for building sound attitudes since it provides the knowledge necessary to take the correct action in a given situation.

If the lecture-discussion method is used with numerous visual aids and supplemented with the other teaching methods available, the total instructional program can be informative, interesting, and educational. If used in conjunction with the chalkboard as the only method of instruction, students will readily lose interest and fail to gain the maximum instruction from the invested time.

#### VISUAL PRESENTATION

A visual aid becomes a teaching method when the professional teacher uses it in a class presentation. The visual aid itself is not the teaching method. A *visual presentation involves the use of one or more visual or audio aids in conjunction with a class presentation by the teacher.* This method can add dimension to verbal concepts, thereby providing for more thorough learning and improved retention. For example, the discussion

with chalkboard of fire extinguishers can be greatly improved through the use of any of the following visual aids or procedures:

1. Typical fire extinguishers, showing their size, shape, and operating principles.
2. Motion picture, strip film, or series of overhead projection transparencies showing extinguishers' construction, operating principle, and effective use in a fire.
3. Field trip to a fire station for a demonstration of the use and operation of different types of fire extinguishers.

Due to time limitations, all of these would not be used. However, the supplementing of the simple lecture-discussion with one of these visual presentations would result in improved instruction and retention. The following subsections will discuss many of the common visual aids and their application to safety education. Besides the ones considered on the following pages, numerous other visual aids can be obtained and developed to supplement and improve instruction.

**MOTION PICTURE.** The motion picture is the most popular form of visual presentation used in safety education. Its value is derived from its simplicity in use and its ability to develop and maintain interest. However, when used without proper class instruction, its effectiveness can be reduced greatly. In order to obtain the greatest value from the motion picture, the following actions should be taken:

1. Review the motion picture prior to presentation to determine its value—prepare an instructional outline.
2. Instruct the class prior to showing the film. Explain its value and special application. Provide definitions of new terms and identify new concepts. If appropriate, require taking notes.
3. After showing the film, conduct a review. This may be conducted as a question and answer period, informal discussion, or written examination.
4. When appropriate, stop the film at important points and discuss the content.
5. Most important, maintain an educational atmosphere in the classroom. It is possible to have the film be both educational and entertaining. It is also possible to permit the picture to be entertaining only—or a rest period for the class.

Because of the popularity and ease of presentation, motion pictures are often used improperly in the school program. The following "Don'ts" should be heeded:

1. Don't establish a *movie day* and show a motion picture whether it is appropriate or not.
2. Don't present too many movies. Weigh the value of each and determine whether the time expended is resulting in the most valuable instruction.
3. Don't show movies without proper review and determination of their application to the lesson.
4. Don't show movies that fail to arrive as scheduled. A movie on fire safety that arrives during the discussion on traffic will be of little value to the class.

Motion pictures available for safety education use can be divided into three categories. Each of these classifications has *motion pictures* which have a particular value for the instructional program.

1. Serious drama and documentaries. These films are designed to provide the viewer with a vicarious accident or accident-prevention experience. The serious drama usually displays a tragic experience and shows how this experience could have been avoided through proper accident-prevention methods. The documentaries show the factual results of serious accidents with the admonition that they could have been avoided through accident-prevention techniques.

These films contain a minimum of factual information. They are designed to develop and modify attitudes by emotionally involving the student in accident situations. In addition, students are often more receptive to the presentation of safety instruction after a vicarious motion picture experience.

Care must be taken in the selection and use of these films since it is possible to shock and scare sensitive children. Most of these films should be limited to secondary and adult education and some restricted for special groups, such as juvenile court referrals.

2. Comedy and/or humor. These films attempt, through the use of animated cartoons, to make the careless person look ridiculous as he creates accident situations. While some information is often presented, the basic purpose of the film is the changing and developing of attitudes. These motion pictures show how a person might appear to others while ignoring accident prevention techniques.

The advantage of these films lies primarily in their motivation and interest for all age groups. They convey their message in an entertaining manner and serve as a valuable addition to the teaching program, provided they are used on an infrequent schedule.

3. **Informational.** This type of motion picture often involves some drama but is specifically designed to provide information on accident prevention. Excellent films of this type are available on such topics as the steps and procedures for developing accident prevention programs, safe procedures in various recreational activities, fire prevention, home and industrial safety, and so forth. This area contains the largest number of films covering all areas of safety and, if properly used with an instructional outline, can provide valuable instruction to the class.

**STRIP FILM OR SLIDE.** The use of the strip film in safety education has slowly developed into one of the principal methods of instruction. While not as dramatic or as easy to use as the motion picture, the strip film has a number of advantages which contribute to its value as a teaching aid. The strip film provides visual information while the teacher presents instruction and conducts a class discussion and question program. The teacher is able to use the pictures on the screen instead of his own drawings. An advantage over the motion picture is the ease with which the teacher can conduct the presentation at the speed and interest level most advantageous to the class. Such factors as previous learning, age level, ability, and interest can be considered and incorporated in the presentation.

An advanced form of the strip film includes an audio record or tape which accompanies the film. The film is advanced a frame at a time either automatically by the record, or manually by the instructor upon receipt of an audio signal. Most educators consider the use of the audio presentation inferior to the oral presentation of a competent teacher. It eliminates the opportunity for the teacher to conduct the presentation at the ability level of the class.

**OVERHEAD PROJECTOR.** The overhead projector provides a visual presentation on a screen which is placed in front of the class and directly behind and above the teacher. The principal advantages gained by the use of this projector are:

1. The teacher faces the class. The screen containing the visual presentation is just above and behind the teacher. This permits the teacher to maintain class control, recognize students for questions and comments, and so on.
2. The teacher can draw on the transparency with a grease pencil and point to important parts of the projection without removing the transparency from the projector. In this way, the teacher can start with a basic drawing and add to it as necessary.
3. Overlay transparencies can be used to develop a complex mechanism

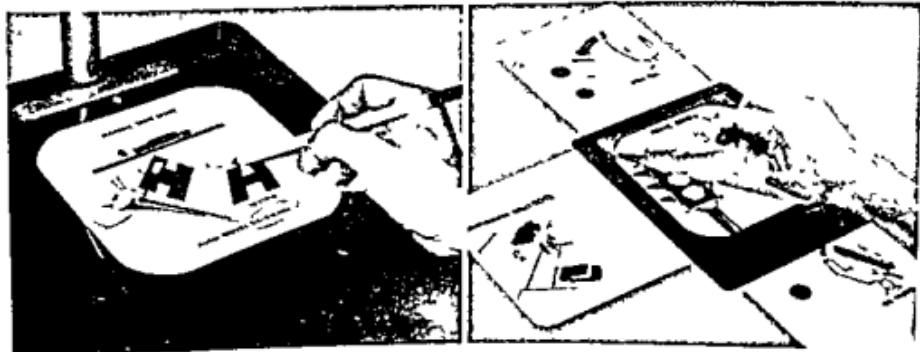
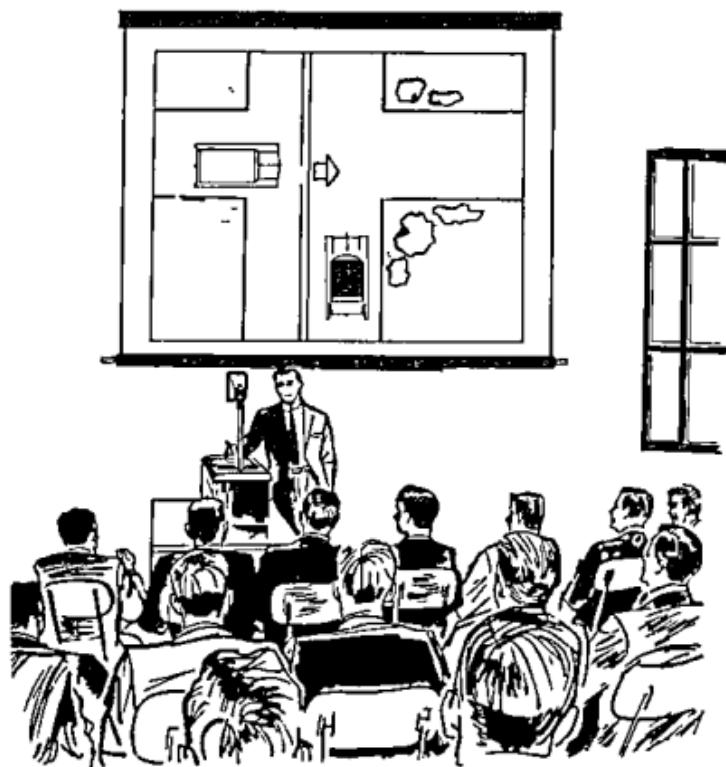


FIGURE 9:1. Overhead projector can become the most valuable visual aid in the school. Top illustration shows the proper use of the projector with teacher facing class as he presents the lesson. Lower left illustrates use of grease pencil to emphasize concepts during presentation. Lower right shows basic transparency with four overlays.

(Courtesy Porto-Clinic Instruments, Inc., New York)

or principle. These consist of a basic unit which is overlaid with additional transparencies to develop the lesson. For example, in explaining the operation of a dry chemical fire extinguisher, the first drawing could be the shell and valve structure. The first overlay could show the dry chemical followed by a second overlay showing the freon or  $\text{CO}_2$  pressure system.

In the hands of a competent teacher, the overhead projector can become the most valuable visual aid in the school. It combines the best features of the slide and film strip presentation with the added features of class control, drawing on the transparency, and overlays.

Unfortunately, commercial production of overhead projection materials has been very limited. However, producers of school instructional materials have begun the production of overlays and, if demand warrants, will expand into all fields of education. The production of overlays has, in the past, been a responsibility of the schools, either by the teacher or the audio-visual department. Due to limitations of time, material, and technical knowledge, teachers have not been active in developing transparencies. Where progressive and well-staffed, audio-visual departments are available, teachers have been able to obtain well-prepared transparencies and overlays for classroom use.

**OPAQUE PROJECTOR.** The opaque projector uses a principle of light reflection to project opaque materials from books, magazines, or even to project the picture of a small object onto a screen at the front of the room. This projector can be extremely valuable in presenting new and current information to the class. The newly illustrated principle of artificial respiration or chart showing the most recent accident statistics can be readily projected on the screen directly from a journal or newspaper. In addition, pictures and drawings from the textbook or reference materials can be projected for class discussion.

The principal disadvantages of this method of projection are the need for a very dark room, projection from the center or rear of the room, and the lack of freedom in drawing on the picture and using overlays. However, materials are easily obtained for projection without added labor in converting them to transparencies. A system which can be used to the advantage of the class involves using the opaque projector for new information. When this information has lasting effect and importance for the class, it can be developed into an overhead transparency for future, more efficient use.

**DRIVER SIMULATORS.** Driver simulators are of principal advantage to

the driver education phase of the program of safety education. They consist of a mechanical device which simulates actual car operation and provides basic instruction in driving and accident prevention skills, as well as advanced accident prevention instruction. This is accomplished through the use of motion pictures illustrating basic techniques and hazardous conditions (e.g., ball bouncing out between parked cars) and then recording driver reaction to the situation. This record is maintained through the use of an automatic recording device.

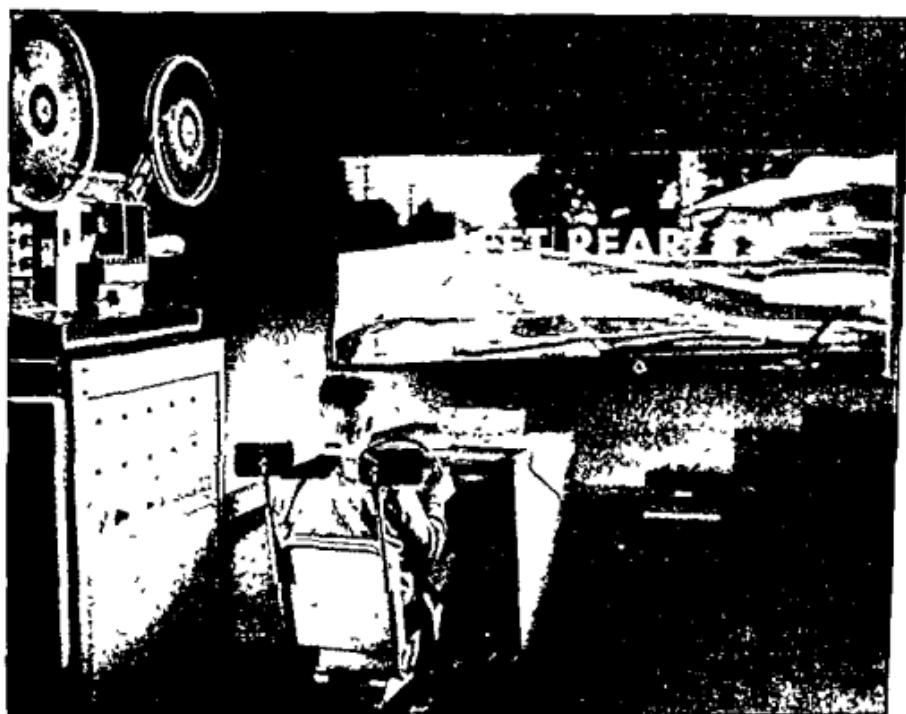


FIGURE 9:2. Over-print command reminds the student to look into his left mirror to check traffic preparatory to making a lane change while driving the Allstate Good Driver Trainer.  
(Courtesy Allstate Good Driver Trainer)

As with all well-planned and developed teaching aids, the driver simulator is a valuable addition to the driver education program when accompanied by a sound program of instruction. The teacher must prepare his program carefully, providing for both a pre-film lesson and a subsequent analysis of the driving performance of the class. During the presentation

the teacher can observe driving skills and assist individual students with their special problems.

There are three driving simulators used in driver education. The AAA Auto Trainer consists of a continuous belt and model car. The student sits in a simulated car seat and drives the model car on the continuous moving belt. The Aetna Drivotrainer and the Allstate Good Driver Trainer both involve the use of miniature simulated cars, a motion picture, and an automatic recording device.



FIGURE 9.3. High school students following the film while using the Aetna Drivotrainer System.

(Courtesy Aetna Life Affiliated Companies)

**FLANNEL AND MAGNETIC BOARD.** The flannel and magnetic boards have wide application in safety education, especially in the area of traffic safety. The use of miniature cars on a diagrammed board provides an opportunity to discuss numerous traffic problems and situations.

**MODELS.** The use of three-dimensional models is invaluable in the presentation of complex mechanisms and principles. Models have their greatest application in elementary school safety education and high school

driver education. In driver education, they assist in the instruction of the operating principles of the automobile and the application of these principles to driving the car. Models used in safety education may be divided into two types:

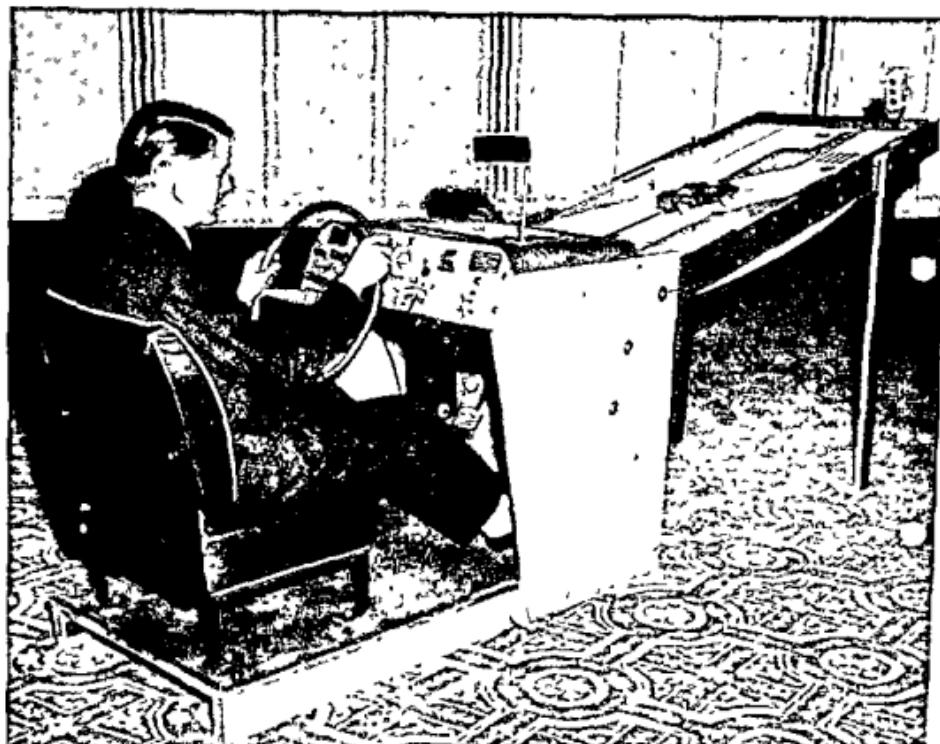


FIGURE 9:4. AAA Auto Trainer being operated by a high school driver education student.

(Courtesy American Automobile Association)

1. Models made of wood, plastic, and other materials used to show the construction of various mechanisms. In many cases, the models operate to show the various principles involved. The most common models of this type demonstrate the operation of the engine, transmission, clutch, differential and rear end assembly, and the steering system. These aids often provide understanding of the operation of these mechanisms that is virtually impossible through other methods. In addition, the expenditure of student time is much less and motivation and interest very high.
2. Cutaways of the original operating mechanisms. Cutaways have the advantage of showing the student the actual parts in both size and

material. However, commercial cutaways are too expensive for purchase. If cutaways are desired, schools must plan on their own technicians to prepare them for instructional use.

Models have the advantage of providing a three-dimensional visual presentation. When this is accompanied by good instruction, the students will quickly develop an understanding of the operating principles and the application of the principles to driver education.

While rarely used, models can contribute to other programs of safety education. Examples of properly prepared extension cords, multiple-wire installations, and cutaway fire extinguishers are a few examples from other areas of safety education which could be improved through the use of models.

**DISPLAYS.** Displays are developed for classroom instruction or placed in a showcase or on a bulletin board for a period of time. When employed as a teaching aid for instruction, display materials can be used to give dimension to instruction and provide the student with an opportunity to see or work with the items under discussion. In safety education, the display is especially appropriate, as the following examples illustrate:

1. Industrial safety. A display including the common industrial safety equipment—hard hat, metal-toe shoes, and safety glasses, plus special equipment such as leather jackets or water-protection equipment—can help the student appreciate and understand industrial accident-prevention procedures.
2. Skiing safety. A display including special shoes, skis, and other skiing equipment will permit the teacher to discuss the importance of using properly designed and manufactured recreational equipment. In addition, the fact that safety is an important consideration in selecting recreational equipment can be emphasized.
3. Fire fighting. A display of different types of fire extinguishers and/or fire-fighting clothes will convert a verbal presentation of fire-fighting into a stimulating and interesting discussion. Retention, motivation, and learning can be stimulated with the simple introduction of the items being discussed.
4. Class-prepared safety posters. Elementary schools often develop safety poster contests in which all students in a class or school are invited to participate.

A large number of displays can be assembled quickly and used to advantage in safety education. In general, stores will be glad to co-operate with the schools by loaning the necessary merchandise and equipment.



FIGURE 9:5. Elementary school pupils prepare educational display. Student involvement in educational activities contribute to the development of socially acceptable attitudes and reinforcement of subject matter.

(Courtesy National Safety Council)

#### GUEST SPEAKER

A presentation by a guest speaker has already been mentioned in the discussion of the lecture method of instruction. It is possible, however, for a guest speaker to use any of the visual presentations discussed in the above section to advantage.

Even though a guest often contributes no more information than the teacher could have presented himself, a number of advantages accompany the use of an outside speaker.

1. Lends importance to the safety movement. The class expects the teacher to be dedicated to the need for accident prevention. However, when the president of the local safety council (also president of some

manufacturing company), a jet pilot, the chief of police, or some other person interested in safety demonstrates the same interest, the class members are more willing to accept safety and accident prevention.

2. Presents information in a different manner. The change in presentation may reach students the regular teacher was not able to reach.
3. Involves community leaders. The use of community members in the educational program of the school gains their civic support for the school in general and safety in particular.

Care must be exercised in selecting a speaker. He must be a person who can speak well before student groups and who has a message to convey. The presentation also must fit into the instructional program and be more than a change of teachers. Attention must be given to the schedule of the guest speaker. Whenever possible, have him meet all groups at the same time rather than having him stay all day to speak to each class individually.

#### FIELD TRIPS

A field trip to an industrial plant, fire-fighting demonstration, underwriter's laboratory, and so on, can provide firsthand information regarding the aspect of the safety program under study. In addition, the presentation by the company representative will add further to the instructional content.

Many schools use regular school buses for field trips and, with proper authorization from parents, avoid school liability complications. Most industries and civic groups welcome the opportunity to provide an educational experience for school children.

#### GROUP ACTIVITIES

Group activities were discussed in detail in the section on the aims of safety education. As described in that section, the principal advantage of group activities centers about the growth and development resulting from student involvement. Up to this section, all the teaching methods with the exception of two types of motion pictures had the principal aim of presenting course content—that is, information on the scope and nature of the accident problem and methods of accident prevention. The fulfillment of this aim contributed to the development of attitudes as a secondary

function. However, group activities reverse this order and make attitude development the principal aim.

Group activities can be used for almost any of the lessons in safety education. However, they require a capable teacher and should not become the only method of instruction. They are time-consuming and do not represent the most efficient method for teaching basic information. The group activity should always culminate in some type of student report. This report could be written, duplicated, and accompanied by a brief oral presentation. It could take the form of individual presentations of research findings, a panel discussion, or a debate. In any case, the entire class should become involved with the activities of each group.

#### ROLE PLAYING

Role playing is a modified form of group activity. Used in moderation and under the direction of a capable teacher, this method of instruction can become a valuable addition to the safety education program. *Role playing involves the assignment of particular roles to class members. Each member then acts out the role to the best of his ability.* A good role playing situation often involves a group presentation, followed by a general class discussion. A simple example might involve various situations between a traffic officer and a violator. More complex situations involving courtroom scenes with a reckless driver, judge, arresting officer, and witnesses can also be used.

The role playing situation is an excellent method of building sound attitudes. In addition, it can also be used to convey valuable knowledge and information.

#### INDIVIDUALIZED INSTRUCTION

Individualized instruction is a necessary and valuable part of most instructional programs. The most common type of individual instruction is the homework or self-study assignment. This may be made on the basis of group or individual assignments. Most safety programs involve both types of instruction. Group assignments consisting of reading and written assignments contribute to the development of an understanding of course content. Special assignments for students interested in particular facets of safety will encourage them to discover the role of safety in specialized areas.

A secondary value of individualized instruction is its direct relationship to future self-study techniques. Since education is an *ongoing process*, the development of sound principles of self-study is an important aim of education. It is developed and promoted through realistic and well-planned programs of self-study.

Another type of individualized instruction involves the practice driving car. In this situation, each student is given an opportunity to drive the car and become familiar with the skills and procedures necessary for safe operation. This direct contact and safe performance under the guidance of a practice driving teacher will provide the students with experiences involving the display of a safe pattern of behavior. Repetitive safe behavior is an important method of developing socially acceptable attitudes toward safety.

#### **CLOSED-CIRCUIT TELEVISION**

This is one of the newer methods of instruction and can contribute to safety education in the same manner as it contributes to other instructional programs. It has the advantage of permitting a single well-planned presentation, often including demonstrations, to be presented to large numbers of students grouped either in a single auditorium or in small classrooms. Following the television presentation, the teacher can easily conduct a class discussion on the information presented.

Like a movie, it becomes increasingly ineffective when repetitively used and when the discussion of the presentation is omitted. It has the advantage, when compared with a motion picture, of presenting current information without elaborate production procedures. However, it does not attain the level of perfection often present in a motion picture presentation.

Closed-circuit television, like the lecture, makes its principal contribution to the presentation of factual information. Its contribution to attitude development is primarily through the changes brought about by the gaining of factual information.

#### **TEACHING METHODS AND UNITS OF INSTRUCTION**

Teaching methods are often ignored during the planning and preparation of units of instruction. Yet the success or failure of the unit is dependent upon how skillfully the teacher selects and uses the teaching method.

The best organized and most carefully selected content is of little value if the teaching methods are not able to transmit the information or inspire the students to learn. Even if the method is *successful in presenting the content*, the professional educator is more interested in selecting the method which will *promote the greatest amount of learning with the least expenditure of time*.

The selection of the teaching method must be given the same attention and consideration as the selection and preparation of the course outline. In selecting the best teaching method or methods for the unit, the following items should be considered:

1. Select methods suitable for the instructional content. Group activities are not appropriate for the presentation of basic information. A display, however, can assist in the presentation of the unit on fire-fighting equipment.
2. Select methods that motivate students to learn. Most units can be taught using many different methods. The teacher can only establish the climate for learning—he cannot force learning. The teaching methods establish this climate and, as a result, are the most important considerations for the teacher in motivating learning. Methods which involve students in discussion and activity as well as a variety of visual presentations have proven successful as motivating factors.
3. Select a variety of teaching methods. Regardless of how successful a teaching method might be, it should not become the exclusive method of instruction. Unfortunately, many teachers utilize the lecture-discussion method, with an occasional motion picture, as the *only format for presentation*. When this happens, student motivation is often lost. Variety leading to motivation is desirable in safety education. Fortunately, the tremendous scope of instruction in safety permits the effective use of virtually every teaching method available.
4. Select methods within the interest and capacity of the teacher. If a teaching method is outside the ability or interest of the teacher, it should be avoided. Teacher enthusiasm is an essential part of instruction.

Once the teaching methods are selected, they must be planned and prepared as carefully as the course outline. If audio-visual aids, guest speakers, or field trips are planned, the specific arrangements must be started early in the semester. If teaching methods are carefully selected and properly planned, the instructional program will fulfill the established course aims.

## SUMMARY

The selection of appropriate teaching methods and the enthusiastic use of these methods in the classroom can make a major contribution to the fulfillment of established aims. While this statement is true for any instructional program, it is most important for programs which list attitude development and change as a principal aim. Attitude change is a function of many factors in the instructional program. Since it is *a readiness to respond to some object in the environment*, it must involve information as well as human behavior. The information is necessary to direct the response, and the behavior becomes the visual interpretation of this information as it is filtered through the attitude structure of the individual.

The instructional program must contain the content and information necessary to provide the person with receptive attitudes and the information necessary to respond in a safe manner. It is hoped that the instructional methods, coupled with the information presented through the use of these methods will jointly contribute to the development of socially acceptable attitudes toward safety.

## ACTIVITIES

1. Select a unit of instruction in safety education and plan the teaching methods which you might use in the presentation of this unit. List the advantages and disadvantages of each. Identify the method or combination of methods which you believe would provide the maximum instruction with a minimum expenditure of time.
2. Visit a local school audio-visual center and identify the services which it provides for the teachers of the district.
3. Prepare and present a short lesson to the class on some aspect of safety. Use a new or unique method for presenting your lesson, such as role playing, display, overhead projector, model, and so on.
4. Prepare a bibliography of films, film strips, and other visual aids available for:
  - (a) Driver education.
  - (b) Fire safety.
  - (c) Transportation of students to and from school.
  - (d) Industrial safety.
5. Plan a group discussion to identify ways in which teaching methods can be used to contribute to each of the general aims of safety education.

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# Providing Safe Pupil Transportation

PROVIDING TRANSPORTATION for school students has become a very large enterprise. Nearly 12.5 million students in the United States are transported to and from school daily in about 175,000 school buses and an additional several thousand private passenger cars that are used regularly for this purpose. If all school bus systems in the nation were operated as a single unit they would form the largest mass transportation system in the history of the world. School bus transportation has progressed rapidly from the relatively inefficient horse-drawn vehicles of some 50 years ago to the fast, efficient, and safe steel-bodied school buses of today. This expansion of school transportation programs has provided both broader educational experience and a greater degree of safety for school students. For these reasons, pupil transportation has become an integral part of education in the United States.

School transportation plays a very important role in providing an adequate educational program for the youth of the nation. The efficiency of modern pupil transportation programs has enabled us to move from the era of the "Little Red School House" into the more economical system of consolidated schools. These larger school units serve a greater number of students and thus are able to provide better laboratory, shop, physical education, and other types of facilities so necessary in modern educational programs. "Of the many factors that make this expanded educational system possible, pupil transportation must be given a lion's share of the credit. Today, approximately one-third of the total enrollment of our ele-

mentary and secondary schools are transported to and from school at public expense."<sup>1</sup>

Pupil transportation deals directly with the safety of school students; therefore, it is an important part of the safety program of most school districts in the country. In fact, no school safety program can be complete without giving consideration to providing safe transportation to and from school for its students. Safe school buses are particularly important in these times of greater concentration and complexity of motor vehicle transportation. Walking, cycling, and riding in private passenger cars are becoming increasingly hazardous means of going to and from school.

The enviable school transportation safety record is not a matter of chance. It has been achieved through the application of sound safety practices to an important problem of school-age youth. If this record is to be maintained, it will be necessary to continue these sound practices and to improve upon them where possible. This chapter will discuss such elements of safe school transportation as, (1) education of riders, (2) selection, instruction, and supervision of drivers, and (3) management of the school transportation program.

### THE SCHOOL BUS SAFETY RECORD

The school bus transportation safety record is excellent. It has been said that the safest place to be in the United States is in a school bus. Although it may be difficult to prove this point statistically, this statement does reflect the confidence that has been built in pupil transportation programs. This confidence is based upon fact. Recent figures compiled by the National Safety Council show that the comparatively small number of school bus accidents which do occur result in very few student injuries and even fewer fatalities.<sup>2</sup>

### SCHOOL BUS ACCIDENT FACTS

It is difficult to make exact comparisons of school bus accidents because some states do not separate them from injuries and fatalities in all motor vehicle accidents. However, 42 states reported 8,908 buses in

<sup>1</sup> Wallace N. Hyde, "Take Industry's Hint: Develop Safe Bus Drivers," *Safety Education*, May 1958, p. 2.

<sup>2</sup> National Safety Council, *Accident Facts* (Chicago: The Council, 1961), p. 91.

Note: All statistics in this chapter are based upon or taken from the publication, *Accident Facts*.

accidents in which 2,067 passengers were injured and 50 killed during 1960. Thirty-one of the children were killed when crossing the street while boarding or leaving the bus rather than in collisions involving a bus. It can be seen that, when the numbers of injured and killed are related to the total number of pupils carried on school buses each day, the injury and death rates are very low. In fact, only sixteen hundred-thousandths (.00016) of one per cent of the children who rode buses to school daily were injured and only four millionths (.000004) of one per cent were killed.

#### STUDENT ACCIDENTS COMPARED

In reporting on all student accidents, the National Safety Council has gathered data on those that took place while the child was under the jurisdiction of the school, and on those that occurred while not under school jurisdiction. Accidents taking place while pupils are going to and from school constituted 7.8 per cent of the total school jurisdictional accidents in 1960. This 7.8 per cent is made up as follows:

TYPE OF ACCIDENT	PER CENT
School bus	.4
Public carrier	.3
Motor scooter	.1
Other motor vehicle—pedestrian	1.1
Other motor vehicle—bicycle	.2
Other motor vehicle—other type	.4
Bicycle—not motor vehicle	.5
Other street and sidewalk	3.1
Other	1.7
Total	<hr/> 7.8

As might be expected, street and highway accidents that do not involve a motor vehicle are the most common type that occur while pupils are going to and from school. These are mostly falls that usually do not incapacitate the injured child for very long.

Accidents that involve a motor vehicle generally are more serious in nature. Motor-vehicle-involved accidents rank second in frequency. The school bus is a factor in only .4 per cent of all accidents as compared with 1.7 per cent of all accidents which involve motor vehicles other than school buses, public carriers, and motor scooters. Hence, it can be seen that the school bus plays a rather small part in the accident experience of students going to and from school.

School buses are used for many activities other than transporting students to and from school. Field trips, athletic events, student excursions, and other activities use school bus facilities. Accurate data on accident experience in these special activities are not available. However, all evidence seems to indicate that the safety record under these circumstances is very good.

It must be recognized that any accident in which the victim receives doctor's care or is forced to be absent from school for one half day or more as a result of the injury is counted in the reports of the National Safety Council. Thus, a bumped knee that keeps a child out of school for one half day and a vehicle crash which incapacitates the child for a month, or causes his death, are each counted as one accident by the Council. The seriousness of the injury is not taken into account. Therefore, it is not possible to compare the degree of injury suffered by children who are hurt while going to school on buses with the degree of injury experienced by pupils who are struck by vehicles while walking to school or injured while riding to school in passenger cars. Nevertheless, observation over a period of years leads to the conclusion that most injuries suffered by young people while riding on a school bus are not as severe as those that are received by the children who are injured while walking to school or are the victims of other types of vehicle mishaps. School bus transportation is an important segment of a total school safety program. School buses have a good safety record, but it is a responsibility of educators to make it even better.

#### **INSTRUCTION AND SUPERVISION OF RIDERS**

Proper instruction and supervision of pupils riding on school buses is an important phase of a school bus safety program. Although they must obey instructions of the driver, riders must learn to protect themselves rather than to depend on the bus driver to take care of them at all times. Each school district, and to a certain extent each school within a district, must develop an educational program for the young people who are riding on the buses. They must be taught to understand the unique traffic conditions of their district. At the same time, the instruction must include the basic characteristics to be found in all good student passenger safety programs. In addition to proper instruction in personal safety, adequate supervision should be provided for bus-riding students. This is usually done through the use of adult supervisors or school bus patrols.

## EDUCATING THE PUPILS

The scope and sequence of education for school bus riders will vary from place to place. However, all programs should include certain basic information.<sup>3</sup>

**PERSONAL RESPONSIBILITY.** Each passenger on a school bus, is responsible for his own conduct and his own safety. No matter how young or how handicapped a rider may be, he must be taught to feel responsible for his actions. As a child matures, he will be expected to take more and more personal responsibility. He should be given every opportunity to obtain the information and attitudes necessary to understanding and appreciating the fact that his own conduct is of basic importance in developing safer school transportation.

**OBEY DIRECTIONS.** Every passenger on a school bus must obey the directions of the bus driver, who is in complete charge of the bus. He is responsible for the safe operation of his vehicle and for the safety of his passengers as well. Therefore, every rider who has been taught to take responsibility for his own actions realizes that his first obligation is to obey the directions of the driver.

All passengers on a school bus must obey the directions of the school bus patrol if such an organization exists. Bus patrols have an important function in school bus safety. The specific duties of patrol members will be discussed later in the chapter, but it should be remembered that obedience to their orders is expected of every student passenger.

**SCHOOL BUS STOPS.** Children should exercise great care in going to the bus stop. Young people who live in urban areas where traffic is heavy should be careful in crossing at intersections and must not play in the streets. Those pupils who live in the country also should be instructed in proper pedestrian practices. They must be taught to walk on the left side of the roadway facing traffic. Where a shoulder exists at the side of the road, the students should walk on this rather than on the main traveled portion of the road. Preferably, they should walk single file and never more than two abreast.

Children should not play in the streets while waiting for the bus. In order to keep the temptation of playing on the roadway at a minimum, pupils should be taught to leave home at the appropriate time. The bus must be routed so that it arrives each morning at a scheduled time. The

<sup>3</sup> National Safety Council, *School Bus Safety—Educating Pupil Passengers*, Safety Education Data Sheet No. 63 (Chicago: The Council, 1954).

parents should know the bus schedule. School authorities should help the parents to determine the time at which a pupil must leave home in order to meet the bus on schedule. The youngster should not arrive so far ahead of schedule that he has time to get into trouble while waiting for the bus. However, children should leave their homes early enough to be able to board the bus on time. A youngster who is in too much of a hurry may become careless and forget to keep alert for hazards. A child may be conscious of dangers normally, but when he is in a hurry he may forget to take proper precautions for his own protection.

**BOARDING AND LEAVING THE BUS.** Children should board the bus with a minimum of delay and in an orderly manner. Crowding or pushing should be prohibited. The younger children should be allowed to get on the bus first. Once on board, each child should take his assigned seat if it is the normal practice to assign seats. Most important, the passengers should remain seated until the bus has stopped at its destination, standing up on a moving bus can lead to falls. Extra precautions must be taken in districts where, because of crowded conditions, school buses must carry standees.

When a passenger leaves the school bus, he must exercise special caution in crossing the road or street. The school generally provides off-street loading zones or an area at the curb on the side of the street on which the school is located. Therefore, the chief danger is to be found on the route between the bus and home. Many children will have to cross a busy street when leaving the school bus at the close of the day. As a result, it is important that they learn the safest way to cross the road after alighting from the bus. The method used in many communities is one that is used in no other type of traffic situation. Hence, it is necessary to teach this method and also to instruct the students that this method is unique to school buses. Pupils are taught to stand in front of the bus after getting off and to cross the street only after the bus driver tells or signals them that it is safe to do so. When the driver has given the signal to proceed, the children should walk across the highway. Although it is not a recommended practice, some school districts discharge pupils and allow them to cross the street without supervision.

As people are usually taught that they should never cross in front of a vehicle from which they have just alighted, the method of crossing the road after leaving a school bus must be emphasized over and over again. Furthermore, there will be specific situations in which special instructions must be given. One good example of such a situation is the need for pupils to cross a multiple-lane highway or street after leaving the bus. There

seems to be no general agreement on what constitutes the best method of crossing such wide roads. Each situation provides a separate problem to be solved. However, there is a basic premise upon which to determine the solution of each individual situation. All children must be taught that, while they are to obey the bus driver's instructions when crossing the road, they are also to rely on their own powers of observation and judgment. It is unwise to trust any motorist. Even though the law requires that they must stop for a school bus, some drivers may not do so.

**EVACUATION.** Pupils should be instructed in the proper method of evacuating the school bus in case of emergency. They should be taught how to use the emergency exit door and the "kickout" windows. They must know how to find and operate the emergency brake, the ignition switch, and the fire extinguishers. Students should be trained in the procedure to follow in case of fire, wind, flood, atomic attack, or any other emergency. Schools not only carry on practice drills, but also use audio-visual aids to instruct children in emergency procedures.

**SPECIAL ACTIVITIES.** School buses carry youngsters to many kinds of events. The student who is transported from home to school and back again is only one of the types of passengers to be considered in a pupil transportation program. School buses take the athletic teams, cheer leaders, song leaders, the band, and often the rooters to games away from home. School clubs use buses for their activities. The pupil being taken on a field trip by his teacher is another type of special activity rider. Special instruction in safe practices should be given to students using school buses for these purposes.

#### ADULT SUPERVISION

Students being transported in school buses must be subject to some adult supervision. This usually becomes the responsibility of the bus driver. Even if the driver is a student, as many are in several states, such drivers are selected for their ability to assume the mature responsibility of supervision of youngsters riding on the bus.

When school buses are being used for transportation to school activities, the faculty members in charge of the activity must assume responsibility for student conduct on buses. Coaches and teachers who supervise student trips of one kind or another must be ready, willing, and able to educate the pupils in the general rules for safe bus riding and also in any specific regulations applicable in special situations. Furthermore, faculty personnel must co-operate closely with the bus driver in supervising the

riders. The safety supervisor should instruct the faculty members in this area of responsibility. Also, guidance must be provided the faculty sponsors of these special bus trips through the medium of board of education policies established to govern the use of school buses on such occasions.

### **SCHOOL BUS PATROLS**

Many school districts use students as members of a school bus patrol to assist with the supervisory functions of school bus operation. In this way, the school bus patrol also can play an important part in the education of riders. Most often the patrol is thought of as a service group that provides assistance to the driver and to the pupil passengers. It is true that patrol members serve as helpers for the driver and students, but at the same time they do much through their example and advice to younger students that must be classed as educational in nature. "School officials who are responsible for pupil transportation programs will find Bus Patrols worthy of consideration as a program helpful in accident prevention and in improving safety education for children."<sup>4</sup>

An important element in the success of the school bus patrol is the teacher-sponsor. Such a sponsor is the link between the school administration and the patrol, the drivers, and the passengers. It is very important to have an interested, enthusiastic faculty member in charge of the patrol, as this gives all concerned a feeling of confidence in the importance of their roles in providing safer pupil transportation. In addition, the sponsor serves the practical function of directing the co-ordination of activities of the patrol, the drivers, and the passengers. A number of problems which face the bus drivers can be worked out in meetings of these groups called by the sponsor.

The patrol receives its training from the teacher-sponsor. The specific duties of the patrol will vary somewhat depending on the size of the bus and the number of passengers carried, as well as on the conduct of the passengers. Also, the traffic situation and the personality and desires of the driver will tend to have an effect on the duties of the patrol members. Nevertheless, there are standard types of duties that bus patrols handle under the supervision of the teacher-sponsor. For example, patrol members usually:<sup>5</sup>

<sup>4</sup> American Automobile Association, *Safety Patrol Handbook* (Washington: The Association, 1960), p. 43.

<sup>5</sup> National Safety Council, *School Bus Safety—Educating Pupil Passengers*, Safety Education Data Sheet No. 63 (Chicago: The Council, 1954).

1. Help supervise the loading and unloading of the bus. A patrol member may form the passengers in a line for boarding purposes and see that they enter the bus in an orderly manner. Another patrol member may stay inside the bus and help the students to find their seats and store their books and belongings properly. Also, he may assist in checking the attendance.
2. Help maintain order among the passengers. In so doing the patrol probably will see to it that the students remain seated, keep reasonably quiet, keep their bodies inside the bus, and refrain from talking to the driver and tampering with the emergency exit.
3. Help supervise students who cross the road after they have alighted from the bus (and, at times, when boarding). This is particularly true in the case of handicapped students.



FIGURE 10:1. The school bus patrol assists the driver in providing safety for pupil passengers.

(Courtesy National Safety Council)

4. Help direct the evacuation of the bus in case of an emergency and during evacuation drills.
5. Help control the students in case of an accident.

In selecting the members of the school bus patrol, pupils who have good attendance records are usually chosen first, because it is important that the patrol members handle their work regularly. The use of substitutes at frequent intervals tends to weaken the efficiency of the patrol. Students selected to serve on the bus patrol should be capable of assuming, and willing to assume, the responsibility involved. Once the patrol personnel has been selected, it is common practice to assign two members for each bus run. Usually the patrol members assigned are those who live as near the end of the bus route as possible. Careful selection, assignment, and training of patrol personnel are important factors in the supervision and education of the pupils in safe school bus riding practices.

### THE SCHOOL BUS DRIVER

The driver is the key factor in safe operation of a school bus. For this reason, he should be as well qualified as possible. "Yet, despite the increasing dangers of highway travel, many communities pay minimum attention to the dependability of their school bus drivers."<sup>6</sup> In order to improve this condition, all states have established rules and regulations to provide minimum standards for selection, instruction, and supervision of school bus drivers. There is a noticeable lack of uniformity among the states because conditions that affect these matters vary from state to state. However, there is considerable agreement on a number of basic principles.

The National Conference on School Transportation, held in 1959, was sponsored by five of the major educational groups interested in the promotion of safer pupil transportation. This conference revised the minimum standards originally set up in 1949 to serve as a guide to the states in the regulation of school buses and in the selection, instruction, and supervision of school bus drivers.<sup>7</sup> The various states have publications which contain rules and regulations or training programs for bus drivers, or both, that follow closely these suggested standards. Some of these guides are:

1. *Regulations and Laws Concerning Operation of School Buses in California.*
2. *Instructor's Guide for Training School Bus Drivers in Florida.*
3. *Guide for the Selection and Training of School Bus Drivers in Maryland.*
4. *Handbook for School Bus Drivers (North Carolina).*

<sup>6</sup> Paul W. Kearney, "Who Drives Your School Bus?" *Safety Education*, Mar. 1954, p. 5.  
<sup>7</sup> National Education Association, *Selection, Instruction and Supervision of School Bus Drivers* (Washington: The Association, 1961), pp. 1-23.

5. *Ohio School Bus Operation Regulations.*
6. *School Bus Drivers in Oregon, Rules and Regulations for Safe Pupil Transportation.*
7. *Handbook for School Bus Drivers (Texas).*

#### SELECTION

To obtain well-qualified bus drivers, it is necessary to set up adequate standards for their selection. In so doing, such matters as the age, character, emotional stability, physical fitness, knowledge, skill, and experience should be considered. For example, no bus driver should be hired for initial employment unless he is between the ages of 16 and 65. A large majority of school bus drivers in North Carolina are students selected, trained, and supervised by personnel of the Department of Motor Vehicles. A driver must be reliable, self-reliant, honest, physically and morally clean, free from addiction to drugs or alcohol, and a user of acceptable language. Furthermore, emotional stability, patience, even temper, and calmness under stress are important to the success of a school bus driver.

Physical fitness is an important consideration in the selection of a school bus driver. A driver needs to have enough strength to handle the bus, including full use of both hands, arms, legs, and feet. He cannot have any communicable disease, and must be free from any disease that might interfere with his driving. It is important that the driver's visual acuity be no less than 20/40 in one eye and 20/50 in the other (with correction), and that his depth perception and field of vision be adequate. In addition, he must have good hearing. Before employment, and once each year thereafter, or as requested by the employing agency, the bus driver should have an examination by a licensed physician approved by the employing agency. The results of the examination should be made known on a form provided by the state department of education.

The prospective driver's knowledge, skill, and experience are important factors to consider in the selection process. He must know the rules governing pupil transportation, as well as traffic laws, signs, signals, and road markings. His skill must be demonstrated in all aspects of safely operating the school bus including double-clutching and downshifting, turning, starting when stopped on an upgrade, backing and steering, stopping and starting at school bus stops, adjusting speed to conditions, and maneuvering the bus in limited quarters. He should be a licensed driver with a record of no convictions for traffic violations and no chargeable acci-

dents for three years prior to the time of his application. An applicant with less than three years of driving experience should be given a driver education course and some apprenticeship training before being permitted to drive a bus alone.

The state department of education or other appropriate state agency should establish a special certificate for school bus drivers. All bus drivers should be required to qualify for the special certificate within a specified time after their employment begins.

#### INSTRUCTION

Selection of the school bus driver, no matter how carefully it is done, cannot eliminate the need for instructing the drivers, either before they are hired or immediately afterward. The employing agency is not always completely aware of the value of an educational program for school bus drivers. Therefore, the state department of education should develop an awareness of this need on the part of employers and the public through conferences set up to discuss the problems in school transportation and through the use of press, radio, and television to bring the importance of instructional programs for school bus drivers to public attention.

The state department of education should set up the principles guiding the instruction of bus drivers, and should assist local districts in planning and conducting training programs. The local instructional activities should be established by the district representatives, with the assistance of state department of education personnel, and should be administered by the local district officials. Provision for a continuous program of training for school bus drivers should be made in the budgets of the state department of education and in the budgets of the local districts. In some states, much of the training is done by state department of education staff employed especially for this purpose. Michigan, New Mexico, and a number of other states have well-developed programs for the training and retraining of school bus drivers.

To be successful, the classroom groups should include from 15 to 25 drivers, with no more than four drivers per vehicle for practice driving instruction. A regular classroom facility and a bus for practice driving are needed. A minimum of 12 hours of class and 12 hours of driving should be provided as an introductory course, and should be supplemented by at least 10 hours per year of in-service training. A small number of well-trained instructors could carry on the teaching of the courses, as it is usually

difficult to obtain large numbers of adequately trained teachers. In some states the training is carried on through colleges. Resource specialists from private and public agencies should be used when they can make a desirable contribution to the program. A program of this type should be of such quality that all school bus drivers are required to attend both the preservice and the in-service classes.

The actual program should include instruction in the following areas:

1. Laws and ordinances relating to driving the school bus.
2. Rules and regulations governing pupil transportation.
3. Driver qualifications and responsibilities.
4. Handling of children.
5. Safe driving practices.
6. Causes of traffic accidents.
7. Care and preventive maintenance of the bus.
8. Caring for emergencies, including first aid.
9. Practice driving under supervision.

The details in the above areas should be filled in after a job analysis has been made of the duties and activities required in driving a school bus. In so doing, provision should be made for meeting the needs of individual drivers as far as they can be determined. Qualified instructors will use recognized teaching methods involving adequate student participation, the use of audio-visual aids, and utilizing tests devised to provide additional learning as well as measuring student progress. High-quality instruction can be expected to make the classes most successful.

#### SUPERVISION

After school bus drivers have been carefully selected and properly instructed in the performance of their duties, it is essential that they be adequately supervised. Supervision is the key to maintaining a safe, economical, and efficient pupil transportation system. The supervisor should be a person who knows his district, can maintain good public relations, and has a thorough understanding of pupil transportation procedures. He must have regular contact with every bus driver and know him well. The supervision of driver education and school bus transportation is combined in some school districts and in several state departments of education.

The duties of the supervisor of school bus drivers are varied. Generally, they will include instruction of the bus drivers, checking on driving practices, observing loading procedures, and controlling activities at bus stops.

The supervisor should take part in the selection of bus drivers and serve as a consultant to them on problems concerning their routes, schedules, and vehicles. In addition, the supervisor can be expected to plan bus routes, keep records, investigate accidents involving the school buses, and serve as the representative of the school administration in working with principals and teachers, and with the lay public, including highway, traffic, and law enforcement personnel. A good supervisor is an important factor in the success of the pupil transportation program.

### MANAGEMENT OF THE TRANSPORTATION PROGRAM

Safety is generally recognized as a responsibility of the administration or management of a business or industry. This is equally true of school bus transportation. Transporting pupils in safety is most certainly a function of school management. *School bus safety is an administrative responsibility that involves both the state and the local school district.*

### STATE AGENCIES RESPONSIBLE FOR MANAGEMENT

In all states, the responsibility for management of the transportation facilities will be shared by several agencies. The agencies may have somewhat different names in the various states, but in general they will be made up of the following and will exercise powers similar to those listed below:

1. The department of education is responsible for matters pertaining to safety of school buses and to the behavior of pupils and drivers.
2. The highway patrol or state police is responsible for the enforcement of state department of education rules and traffic laws.
3. The department of motor vehicles is responsible for issuing and revoking the licenses of school bus drivers.
4. The public utilities commission is responsible for regulating common carriers that transport pupils to school.

Reference has been made to state publications that concern themselves with rules for bus operations and with selecting and training drivers. Similar materials have been developed to aid school districts in managing transportation facilities. Such publications include:

1. *An Administrator's Handbook of School Transportation* (Alabama).
2. *Georgia Minimum Standards for School Buses*.
3. *School Bus Transportation in Illinois*.

4. *Transportation for Iowa Public Schools.*
5. *Transportation, New Jersey Handbook for Boards of Education and School Boards.*
6. *The New Mexico Minimum Standards for School Buses.*
7. *Minimum Standards for Design and Equipment of School Buses for West Virginia.*

#### MANAGEMENT IN THE SCHOOL DISTRICT

Final responsibility for management of the school transportation program rests with the administrative personnel of the local school district. This is true whether the school bus transportation system is owned and operated by the district or contracted for with private carriers. Some districts own some buses and contract for others. As with other aspects of a safety program, planning is a matter of primary importance in pupil transportation. The planning for safe school transportation should encompass all phases of the operation.<sup>8</sup> This was pointed out further at a recent National Safety Congress in Chicago, as follows:<sup>9</sup>

“. . . The results of [our survey] caused us to conclude [that] the lack of Board of Education policy on school bus routing contributes to the inefficient and uneconomical organization of the present transportation system. The number of side spurs to the main bus route can be reduced by proper routing at a considerable savings to the Board of Education. Policy should at least be concerned with the basic questions as to the maximum travel time for high school and elementary pupils on school buses, maximum speed at which buses will be permitted to operate, and the maximum time that transported pupils arrive at school before it opens—or wait for a bus after school is dismissed. . . . In the final analysis, let us not lose sight of the fact that the purpose of safety, efficiency, and economy in transportation is to make available the better educational program, which, after all, is the basis of our existence. . . .”

The management functions of school administrators in the development of a school transportation program are many and varied. However, they can be considered to fall into these three categories: administration, operation, and school bus equipment.

**ADMINISTRATION.** The purely administrative aspects of the pupil transportation program deal with problems of organization and business man-

<sup>8</sup> Burton H. Belknap, *The School Bus* (Minneapolis, Minn.: Educational Publishers, 1950), p. 127.

<sup>9</sup> William B. Wolf, *Motor Transport Newsletter* (Chicago: National Safety Council, Dec. 1961), p. 11.

agement of the operation. Some important administrative functions include:

1. Development of district policies governing all aspects of pupil transportation.
2. Planning the over-all school transportation program based on a survey of district conditions to determine needs for pupil transportation and the type of service best fitted to meet those needs.
3. Selection and training of bus drivers, mechanics, and other needed personnel including a district director or supervisor of transportation.
4. Providing adequate insurance protection against possible property damage and liability losses.
5. Maintaining necessary records and reports including budget, costs, and numbers of students transported.
6. Evaluating the safety and efficiency of the various facets of the school transportation program.

**OPERATION.** Operation of the transportation program deals with the daily functioning of the transportation system. Program operation includes such items as:

1. Routing, scheduling, and dispatching buses.
2. Providing safety precautions in selection of bus stops, loading and unloading of passengers, and passenger conduct on buses.
3. Providing safety instruction and precautions for riders while in the bus, at bus stops, and on the routes the pupils must cover between the bus stop and their homes.
4. Providing such added services as pickup and delivery of handicapped children, scheduling special activities buses, and taking students on field study trips.

**SCHOOL BUS EQUIPMENT.** The acquisition, maintenance, and care of school buses is an important responsibility of the school district. Some of the problems relating to this phase of the pupil transportation program include:

1. Obtaining buses, supplies, and equipment that conform to or exceed state minimum standards.
2. Inspecting, at regular intervals, school buses by district officials and such state officials as required by law.
3. Maintaining buses in a safe and economical operating condition at all times through provisions for both preventive maintenance and repair work.
4. Providing proper storage and maintenance facilities for all equipment.



FIGURE 10:2. This modern school bus is equipped with flashing red lights, an extremely large windshield, concave mirror, outward opening doors that are actuated by air, left side emergency exit door, non-skid steps with white safety edge, an automatic braking system, and many more features designed for the safety of student passengers.

(Courtesy Gilling Bros., Hayward, California)

### SCHOOL BUS TRANSPORTATION IN THE FUTURE

School bus transportation will change and improve in the years to come. It is quite possible that the school bus of the future will be nuclear powered or will move a short distance above the ground on a cushion of air. Such equipment has been already tested. While we move toward this type of transportation, it is probable that the conventional type of bus will undergo many improvements. Large, double-decker buses may come into use. Safety devices will be electronically controlled. Tires will be blowout proof, and more dependable air brakes will be developed. Probably television sets will be installed so that education may begin at the time the child enters the bus.

The work of the National Committee on Uniform Traffic Laws and Ordinances has brought about increased uniformity in school bus laws. National conferences on pupil transportation have developed recommended minimum standards for school bus operation. A greater degree of uniformity has been realized as a result of these efforts, and there is sure to be even more in the future.

## SUMMARY

*Pupil transportation is an integral part of a total school safety program.* The school bus provides a high degree of safety for children going to and from school or participating in special trips as part of either co-curricular or regular classroom activities. This good record must be maintained and, if possible, improved.

To improve the safety record of the school buses, the riders must be taught proper safety practices. All districts provide educational programs, some more effective and complete than others, in an effort to get the pupils to understand the importance of co-operating in measures established for their safety. Some districts make excellent use of school bus patrols in the education and supervision of riders.

Improving the procedures for selecting, instructing, and supervising school bus drivers is also an important factor in bringing greater safety into pupil transportation. Suggested minimum standards have been established by national conferences. These suggested standards have helped the states in setting up rules to aid school districts in providing greater safety.

A number of state agencies have a responsibility for the transportation program, but it is the local school district that must take final responsibility for its success or failure. These activities, for which the school administrator is responsible, are numerous. They range from the planning and initiation of the program, through all phases of the operation, to the final evaluation of its success.

## ACTIVITIES

1. Survey the pupil transportation program in a nearby school district. Evaluate the program in terms of organization and management.
2. Make an analysis of the school bus accident reports maintained by a school district during the last year.

3. Prepare a brief talk for your class, outlining reasons for adopting a bus patrol in a school bus program.
4. Prepare a job analysis for the position of school bus driver.
5. Ride a school bus route when pupils are being brought to school. Prepare a report on safety factors observed including (1) supervision, (2) bus stops, (3) routing, (4) boarding and leaving the bus, and (5) discipline.
6. Visit a school bus maintenance facility. Evaluate the maintenance program in terms of providing pupil safety.

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# School Liability

and

# Insurance Protection

EVERY TEACHER must be aware of the legal as well as moral responsibilities he has for the welfare of his pupils. The previous five chapters of this section on "The School Safety Program" emphasized the moral and educational responsibilities as well as the professional methods which the teacher and school have available to fulfill their responsibilities. This chapter is planned to provide insights into the legal aspects of safety, and the ways in which the teacher is involved in school liability.

At first thought, a discussion of school liability and insurance protection might seem contradictory to a book dedicated toward the promotion of an accident-free society. However, accidents will continue to happen in the school as well as in other areas of the environment. Liability laws are made to protect the innocent. If a student is injured in school and his parents or guardians believe the school or its representatives were negligent in providing for the student's safety, they have the right to seek a financial judgment to pay for damages arising from the accident. Most school districts and state governments are still immune from school law suits. *Any teacher, however, may be sued as the result of an accident. The law requires that the person bringing suit against a teacher must show that the teacher failed to take the action a prudent teacher would have taken to avoid the accident.* Even with the burden of proof being the full responsibility of the person bringing suit, some capable teachers have been sued and lost their cases. Due to lack of knowledge, circumstances, or carelessness, an accident occurred which a prudent teacher should

have taken precaution to avoid. As a result of this ever present possibility, each teacher must consider the fact that he might be sued in the aftermath of an accident. He must, therefore, familiarize himself with the extent of his personal liability and the necessary precautions to protect himself.

Liability laws are designed to protect, not persecute, the innocent. Teachers, as well as other professional groups responsible for the safety of others, often look at these laws as a threat to their careers and question their existence. Liability laws have made and will continue to make a major contribution toward the promotion of a safe environment. They provide for the following functions:

1. Protect the innocent by promoting safety activities which might have been ignored had liability laws not existed. In this manner, liability laws contribute to the reduction of accidents.
2. Establish fault and, most important, cause of accidents. This action will permit correction of the situation and avoidance of similar accidents.
3. Provide financial payment to innocent victims, thus helping relieve the financial burden imposed by the accidents.

## TEACHER AND SCHOOL LIABILITY

A teacher is *liable for a school accident when he is legally responsible for the occurrence of the accident. He is, then, answerable for financial claims and damages.* In all but nine of the 50 states, schools districts and state governments have retained their historical immunity against law suits and cannot be held liable for an accident. As a result, a person who believes the school is legally responsible for an accident in one of the 41 states claiming immunity must bring suit against the teacher, individual school administrator, or other district employee.

The concept of government immunity is based upon common-law reasoning during the Middle Ages in England: first, the King can do no wrong; second, the State represents the King and therefore can do no wrong. Being infallible, the State cannot be sued without its consent. The State is therefore immune from legal suit for tort.<sup>1</sup> This concept is often referred to as the *divine right* or *common law* immunity. While this belief has been substantiated in the courts and has historical precedence, a recent court decision in Illinois may have established the legal basis

<sup>1</sup> N.E.A. Research Division for the National Commission on Safety Education, *Who is Liable for Pupil Injuries?* (Washington: National Education Association, 1963), p. 18.

upon which this immunity may be challenged. In this case, a student sued the school district for \$56,000 as compensation for personal injuries sustained when the school bus left the road, allegedly as a result of the driver's negligence, hit a culvert, exploded, and burned. The case was finally heard by the Illinois Supreme Court where Justice Ray I. Klingbird wrote, "The rule of school district tort immunity is unjust, unsupported by a valid reason and has no rightful place in modern society. . . . We do not believe that in the present day and age, when public education constitutes one of the biggest businesses in the country, that school district immunity can be justified on the protection-of-the-funds theory."<sup>2</sup> Even though the Illinois legislative body immediately enacted a \$10,000 recovery limitation on each case, this legal decision has resulted in a serious re-evaluation of the concept of government immunity. Within the 10-month period following this decision, four other state supreme courts dealt with this same principle. Wisconsin and Minnesota joined Illinois in supreme court decisions against government immunity. On the other hand, the Pennsylvania and Michigan Supreme Courts ruled the other way, sustaining government immunity. As a result, in one year five cases attacking the precedence of government freedom from tort liability have been heard by five different supreme courts—three of the resulting decisions have dethroned the traditional state immunity.<sup>3</sup>

Besides the legal decisions cited above, nine states have enacted legislation which waived school immunity.<sup>4</sup> While this legislation has taken different forms in the various states, each of them has accepted some of the responsibility for answering claims resulting from school injury. In California the waiver of immunity is complete. In Washington the legislative statute permitting suit allows legal action on claims applied to all school activities, except accidents arising from athletic equipment and playground apparatus. Some of the remaining nine states have enacted statutes which indicate that, if teachers are held liable for an accident arising out of school duties, the school district will pay for the judgment within specified limits. Other states, such as Wisconsin, require that safe school premises be provided on penalty of liability.<sup>5</sup> Even though some states have accepted legal responsibility for school accidents, the majority are still protected from suit by the *divine right* precedent. As a result, the

<sup>2</sup> "News of the Schools," *School Management*, July 1959, p. 21.

<sup>3</sup> Harry N. Rosenfield, "Guilty," *Safety Education*, Apr. 1963, p. 16.

<sup>4</sup> Frank J. Conway, "Who's Liable?" *Safety Education*, Oct. 1960, p. 3.

<sup>5</sup> Harry N. Rosenfield, "Legal Liability and the Cost of Accidents," *Safety Education*, Apr. 1957, p. 4

burden of responsibility is left to the individual employees of the district, particularly the teachers.

#### TORT LIABILITY

While many different forms of liability exist, tort liability is the one involved in the teacher-pupil relationship. *"A tortious act is a wrongful act consisting of the commission or omission of an act by one, without right, whereby another receives some injury, directly or indirectly, in person, property, or reputation."*<sup>6</sup> The act does not have to be intentional. In almost all tort cases, the wrongful part of the act is committed without intent. In either case, a tortious act involves one of the following situations:

1. An act or omission causing harm which the person did not intend to cause, but which should have been foreseen and prevented.
2. An act in itself contrary to law or an omission of a specific legal duty, which causes harm not originally intended.
3. An act which is intended to cause harm and is successful.<sup>7</sup>

*Tort liability then consists of the condition whereby a person is responsible and obligated for a claim involving injury to a person, his property, or reputation.*

Tort cases always involve a personal claim rather than criminal prosecution. That is, a tort law suit would be worded *Jones vs. Smith* rather than the criminal form of *State vs. Smith*. Therefore, a tort law suit is one which normally involves legal action between two people rather than criminal prosecution by the state.

In school liability cases, the greatest danger arises from the first situation for tort liability which involves unintentional harm resulting from an act or omission of an act. Some school examples which could result in suit if injury occurred are:

1. A physical education teacher permitting students to engage in a new activity without proper instruction.
2. An industrial arts teacher failing to warn a student about the danger which could result from improper use of a piece of equipment.
3. A science teacher leaving the room while students are working on laboratory experiments.

<sup>6</sup> N.E.A. Research Division for the National Commission on Safety Education, *Who Is Liable for Pupil Injuries?* (Washington: National Education Association, 1950), p. 5.

<sup>7</sup> *Ibid.* p. 5.

## NEGLIGENCE

Negligence must be proven before an award can be made against a teacher or district for injury or damage resulting from the school program or activities. *Negligence is defined as the failure to act as a reasonable person, guided by ordinary conditions, would—or doing something which a prudent and reasonable man would not do.*<sup>8</sup> Negligence is a legal conclusion that can be determined only by the courts. The burden of proof in negligence actions lies with the *plaintiff, the person bringing suit, rather than the defendant, the person being sued.* In the student-teacher relationship, the student's parents or guardians must sue the teacher or, when permitted, the school district, and prove that a school official acted in a negligent manner which resulted in injury. When this is accomplished, the person bringing suit will be able to collect from the sued, usually an amount of money directed by the court. In many situations cases of tort liability are settled out of court by mutual agreement of the parties involved in the case.

The court normally evaluates at least three factors in determining whether a teacher, or other person being sued, is guilty of negligent behavior. These factors also influence the amount of damages awarded the plaintiff.

1. **Test of foreseeability.** When a reasonable person could have foreseen the result of his actions or omission of action, and disregards this knowledge, he is liable for negligent conduct. At the same time, if the danger could not be foreseen by a prudent person or was beyond the knowledge expected of the person, he is not liable.
2. **Contributory negligence.** When the plaintiff's own action contributes to his injury, and when this action or omission of action is determined to be negligent, the plaintiff is guilty of contributory negligence. In these cases, the plaintiff normally cannot recover damages. When both parties are at fault, neither can recover from the other for resulting harm.

"In a California school industrial arts laboratory, . . . a student was struck in the eye by a piece of metal, resulting in loss of eyesight.

The student had been assigned a seat in the corner some distance away from the others. He was directed to complete a written lesson. Instead of reporting to the teacher on completion of the lesson, as he had been directed, he walked

<sup>8</sup> *Ibid.* p. 4.

toward three boys who were pounding aluminum and watched them from a distance of about twelve feet. It was in this position that he was struck in the eye by a piece of metal.

It was the contention of the plaintiff that the district was negligent because goggles were not provided for, and required of, all shop personnel . . . as standard protective equipment.

In deciding in favor of the defendant school district, the court maintained that no substantial evidence was apparent that would indicate such danger existed and was known, or ought to have been known, to the authorities.<sup>9</sup>

It should be noted that in deciding this case in favor of the defendant, the test for foreseeability, as well as contributory negligence, was evaluated by the court.

3. Comparative negligence. This is a relatively new concept in legal judgment, one which attempts to weigh the extent of liability. "In this concept, the courts will assign the degree of fault between the defendant and the plaintiff, and apportion the amount of recovery possible for the plaintiff."<sup>10</sup> This type of decision permits the court to assign degrees of liability rather than a judgment based on full or no liability.

#### LIABILITY IN PHYSICAL EDUCATION

Whenever a student is active and physically engaged in an activity, he is more liable to be involved in an accident than when he is seated in the classroom. As a result, physical education and other school programs involving activities represent the greatest potential hazard for school accidents and resulting liability suits.

Physical education activities, including competitive sports, account for nearly 40 per cent of all school accidents. If general playground and unorganized activities are included, over 50 per cent of all school accidents can be attributed to physical education activities. The three leading areas of injury are unorganized activities, football, and basketball. Unorganized activities are engaged in by the majority of children and, without pre-established rules, develop a hazardous situation. This hazardous condition is verified by the statistics. Football and basketball rate high in the injury category because of the constant bodily contact and pressures to push human accomplishment to the utmost. Because of the relatively high

<sup>9</sup> Fred A. Olsen, "Student Injuries and Teacher Liability (Part 1)," *School Shop*, Oct. 1960, pp. 21-22.

<sup>10</sup> Dennis J. Kigin, *Tort Liability Affecting Shop Teachers with Provisions for Avoiding Accidents and Litigation*, Dissertation, Univ. of Missouri, 1959, p. 53.

number of injuries, physical education teachers must be particularly aware of the accident potential, methods for creating a safe school environment, and their moral and legal responsibilities to the students, as described in Chapters 7 and 8.

A review of some of the school incidents which have resulted in lawsuits will aid in understanding the potential hazards and resultant responsibilities of teachers of this important phase of the school program.<sup>11</sup>

1. First base was an ordinary square sack on a slippery gym floor, and the person was hurt because the base slid away from her. Reasonable care would have required under such circumstances that the base be secured against sliding away.
2. A school board scheduled three basketball games to be played simultaneously in a gym of such size that the three courts were contiguous or overlapping. The school board was liable when one of the players was hurt by another from the next court. Reasonable care would have anticipated danger from such overcrowded conditions under the circumstances of a fast-moving game.

#### LIABILITY IN INDUSTRIAL AND SCIENCE EDUCATION

The growth and development of industrial education, coupled with emphasis in laboratory and experimental work in the exact sciences, has resulted in an increased awareness on the part of school officials of the accident potential in these areas. At present, less than five per cent of school accidents take place in industrial education laboratories and less than one per cent in science laboratories. However, with the continual advance of science and technology, these instructional programs will become more important, thereby increasing the use of equipment and research apparatus. The accident potential is high. The teachers of these subject areas should take every opportunity to acquaint themselves with safety procedures, and plan and conduct appropriate safety programs for their students.

A review of some of the school accidents which have resulted in lawsuits will aid in understanding the potential hazards and resultant liabilities in these programs.<sup>12</sup>

1. A pupil was injured on a machine while trying to extricate a piece of

<sup>11</sup> Harry N. Rosenfield, *op. cit.*, pp. 5-6.

<sup>12</sup> N.E.A. Research Division for the National Commission on Safety Education, *op. cit.*, p. 20.

metal when another pupil stepped on the treadle. The action of another pupil does not relieve the teacher from liability.

2. A pupil was injured while using a power saw without a guard. Even though the pupil knew there was danger in using the saw without a guard, he did not know the amount of danger, and hence his using the machine without a guard does not constitute contributory negligence. The school district and/or teacher are responsible for permitting the unguarded machine to be used.

#### LIABILITY IN DRIVER EDUCATION

Driver education has, during the past two decades, grown into a major program within the school curriculum. Since the practice driving phase of driver education involves teachers in possible automobile accident situations, the program must be given special consideration regarding its potential as a source of tort liability. A basic objective of driver education is to help relieve the traffic accident problem. This area of traffic safety is the most destructive phase of the nation's accident problem. As a result, the driver education student must enter this high-accident "arena" every time he receives a driver training lesson. The driver education teacher must therefore both teach and practice the procedures which will lead to the development of a safer driving community. The common law immunity enjoyed by over 40 of the states also applies to the program of driver education. The states which have abrogated their immunity laws have, at the same time, made themselves liable for driver education accidents.

Several states have provided that insurance may be purchased for driver education vehicles and claims may be made against the states within the framework of the insurance policy. This type of permissive legislation does not repeal the general immunity but does provide protection for children injured while engaged in their practice driving phase of instruction.

#### TEACHER LIABILITY

Each teacher must carefully evaluate his personal status and determine the extent of his liability. This will vary from state to state, teaching area to teaching area and, depending on individual insurance, from teacher to teacher. The most important point is that *no teacher or*

individual is free of tort liability. As a result, each teacher must be aware that, if he is guilty of negligence in the safety of a student, he may be held liable for the resulting damages. In a number of states, statutes have been passed which compensate the teacher for judgments awarded against him (often within certain maximum limitations) if they result from the performance of school responsibilities. It should be noted that these statutes protect the teacher from financial loss but do not make him immune from tort liability.

In states such as California, where immunity rights have been repealed through legislative action, the teacher received no protection against tort liability. Suit may be brought against the teacher and, if won, the teacher is responsible for *damages (compensation, recompense, or satisfaction for an injury)* as directed by the court. However, the fact that the district may be sued and, as the employer, is normally responsible for the actions of the teacher, indirectly relieves the teacher of most of the financial responsibility for accidents. People seeking restitution for injury will normally sue the district, since it is responsible for the action of the teacher and normally has the financial means to pay the damages awarded by the court. In most cases the teacher, as well as administrative personnel and the school district, are originally named in the suit. However, the teacher has no assurance that the district will be required to pay damages and he may be held responsible for his negligent action.

In the 41 states which do not permit suit against the district, the responsibility for tort liability is placed almost exclusively on the teacher. Fortunately for the teachers, few cases of negligence have been brought into court, and of those which went through the legal process only a few have resulted in proven negligence and the awarding of damages against the teacher. However, the cases of negligence which have been proven should cause every teacher to evaluate the possibility of his being involved in a situation of this type.

Negligence on the part of a teacher must be proven before damages can be awarded against him. While most teachers have sufficient knowledge about their subject area to avoid incorrect or inaccurate instruction, the concept of *omitted instruction* is possible among all teachers, including the best. It behooves all teachers to build safety into their school responsibilities and make adequate provisions to protect themselves against tort liability through errors of omission. The following procedures are examples of those which will *help a teacher avoid conditions which might lead to liability suits:*

1. Remain in the classroom while classes are in session or students in the room.
2. Obtain consent statements from parents before engaging in an activity which is different from the normal class activity (field trips, nature hikes, and so forth).
3. Exercise prudence in storing materials, especially dangerous chemicals.
4. Administer safety tests before students are permitted to engage in new or dangerous sports or operate industrial education laboratory equipment.
5. Anticipate student actions and correct conditions which might lead to student accidents.

#### **SCHOOL BOARD, DISTRICT AND ADMINISTRATOR LIABILITY**

The school board and school district enjoy common law immunity unless the state has taken legal action to eliminate it. Even though the school board is composed of individual members, usually they are not liable for their negligent acts since they are considered a government entity and, as such, enjoy any immunity the state government has retained.<sup>13</sup> School administrators also enjoy a form of immunity from legal action. As individuals, they could be sued for negligence in the same manner as classroom teachers. However, administrators are rarely made defendants in pupil injury situations. They have a position which places them between the teacher and the school board. Traditionally, this position has kept them free of most liability suits. In districts where the school board and district have retained state immunity, the teacher is usually the one named in any tort liability case. Whenever a teacher is present and in direct charge of a group of children, whether in a classroom, passing through corridors, on a field trip, or on the playground, the responsibility for student safety remains with the teacher. It has not been possible to transfer student responsibility from the teacher to the principal. In states where school districts and boards are not immune, legal responsibility is usually passed from the teacher to the district. The administrator again is passed over. To date, the administrator's legal responsibility has never been discussed by the courts to an extent that would clarify his position in school liability. However, if the administrator teaches a class or accepts direct responsibility of a group of students, he is serving as a teacher and has

<sup>13</sup> *Ibid.*, p. 10.

the same responsibility for student safety and the same exposure to suit in case of injury.

Even though the school administrator seems to enjoy a relative degree of freedom from legal recourse, the school board often views his position as having moral if not legal responsibility. If a school develops a poor accident record, the principal is the person who must assume the responsibility for the poor record and plan corrective measures. In addition, the school administrator has been delegated the responsibility of working with teachers, counselors, and the PTA in planning, implementing, and supervising the total school safety program.

### INSURANCE PROTECTION

Every professional person responsible for the welfare of others should ascertain the extent of his personal liability and investigate the possibility of insurance protection. This is particularly true of teachers. Proper insurance coverage will protect the teacher or district from financial ruin, as well as provide payment to assist the injured party in resuming a normal life.

#### FOR THE TEACHER

The teacher should receive first consideration for protection against damage claims since he is the most vulnerable person in the school. The principle responsibility for obtaining this protection and verifying its existence remains with the teacher. He must carefully evaluate the extent of personal liability which might arise within the framework of his teaching and extracurricular responsibilities, and then take the necessary steps to obtain insurance protection. These steps may include:

1. The purchase of a liability policy which will pay damages awarded against him for any accident occurring in connection with his teaching situation. Professional organizations often have policies of this type available to all members on a group coverage basis. The basic contract is written with the organization, and member names are added as they subscribe. Cost is usually nominal. Often a \$10,000 liability policy, which will protect the teacher from all school liability suits, costs the individual teacher as little as one to two dollars per year.
2. The application of protection obtained through an existing homeowner or automobile insurance policy. Homeowner policies generally con-

tain liability protection for accidents happening on personal property. This coverage is often extended to provide blanket protection against all personal liability suits, whether at home, work, or in the community—with the exception of automobile accidents. Automobile liability policies often extend their coverage to protect the insured while driving *any* automobile. It is often possible to have this coverage extended to include protection for a driver education teacher engaged in practice driving instruction.

3. The purchase of a simple personal liability policy from an insurance agent or broker. These policies usually include full protection, with the exception of automobile liability.

The driver education teacher must be particularly alert to make certain he is protected during behind-the-wheel instruction. Many basic liability policies exclude automobile protection, since this coverage is expensive and must be purchased separately. If there is any doubt about his coverage as listed in the policy, the teacher should obtain a written agreement describing his coverage while engaged in practice driving instruction.

The potential liability of a teacher is greatly reduced when the state repeals immunity. However, many states hold tenaciously to their *divine right* protection. Unless the state has passed legislation which provides for the payment of all awards against the teacher, he should carefully consider the purchase of insurance protection to provide the security needed for effective teaching. Even in states providing for the payment of claims, the teacher should make certain that he is fully covered.

#### FOR THE DISTRICT

The school district must be concerned about insurance protection only when the state has taken legislative action to remove or modify district immunity. Some states have authorized districts to purchase insurance policies and then permitted suit within the framework of the policy. In some cases, this coverage extends only to the practice driving portion of driver education. In others it provides some protection to all phases of the school program.

In school districts which permit law suits, insurance protection becomes an important consideration. The potential liability is high and insurance premiums, while low on an individual basis, can appear quite large when applied to a large school district. As a result, some districts have considered self-insurance; that is, they pay claims as they arise.

However, claims are difficult to budget and a large court award could bankrupt a district. A few years ago a high school student was injured while playing football and, after due deliberation, a judgment of \$325,000 was obtained against the district and probably would have resulted in bankruptcy had the amount not been reduced to just over \$118,000.

Most school districts which have been permitted to purchase insurance by legislative action have obtained this protection for their teachers and pupils. Every teacher should become aware of the insurance coverage, if any, his district has purchased, and how this coverage will protect him in case of suit.

#### FOR THE STUDENT

A new type of insurance protection for the student injured in a school accident has been developed during the past few years. In districts subscribing to such a plan, parents are asked to purchase accident insurance coverage for their children while at school. These policies carry various forms but generally provide medical payments for all types of school accidents. Unlike other medical plans, they usually will not cover illness, but will provide payment for such things as fitting glasses for eye injury and dental care for injury to teeth. These policies often include clauses, similar to workman's compensation, which provide cash settlements for lost limbs, sight, hearing, and so on, and purchase of artificial limbs and special wheel chairs.

The purchase of this insurance indirectly aids the school district in meeting its liability responsibilities. Many law suits have been initiated because this was the only method whereby the injured could collect for medical expenses for treatment of his injury. Payment of these expenses by an insurance policy relieves the district of these potential suits. Most important, however, is the fact that these policies provide protection for the pupil and assure him adequate medical attention should injury occur while he is at school.

#### FOR SPECIAL GROUPS

Efforts have been made during past years to by-pass state immunity in regard to liability and the accompanying provision which forbids the purchase of insurance by the state or its representatives (school districts). While many states have abolished or modified these restrictions, the large

majority of states still prevent districts from purchasing insurance or accepting liability for school accidents. As a result, plans such as the Athletic Benefit Fund have been developed to protect special groups within the school.

The purpose of this plan is to provide a reasonable financial payment to provide proper medical care and rehabilitation expenses. This program is usually statewide for all athletes registered by their schools. In case of injury, payment is made on the basis of severity, type of injury, and needed care. In some states, this program has been extended to other student activities.<sup>14</sup>

## SUMMARY

The awarding of a judgment against a teacher or school district must be based on proof which shows that a representative of the school was guilty of negligence. When this is accomplished, the court may award damages based upon the factual information presented in support of the claim.

Since most school districts are protected by traditional government immunity, only individual employees of these districts can be sued. The teacher is the person most often named as the defendant since he is directly responsible for the students in his classroom. Historically, it has not been possible to have any of this responsibility transferred to the school board members or school administrators. Hence, if the district enjoys immunity from suit, the parents of an injured student must bring suit against the teacher and attempt to prove negligence.

In order to teach and conduct school activities in a professional and educational manner, the teacher must be kept as free as possible from concern over potential law suits. This can best be accomplished through insurance protection. Even though this might be shown to be a responsibility of the school district, the teacher must accept this responsibility if the school district cannot or will not accept it due to a lack of permissive legislation by the state. In any case, each teacher should evaluate carefully his liability protection for school accidents and, if necessary, purchase the additional protection which will provide the assurance needed to conduct the instructional program.

<sup>14</sup> Herbert J. Stack and J. Duke Elkow, *Education for Safe Living*, third ed. (Englewood Cliffs, N.J.: Prentice-Hall, 1957), pp. 314-315.

## ACTIVITIES

1. The waiving of state immunity is a controversial issue in many states. Plan a debate based on the question: "Should states pass legislation which will waive the common law immunity which prevents individuals from bringing cases of tort liability against the state or its representatives?"
2. Analyze your liability and insurance protection in the state and district in which you teach or plan on teaching.
3. Prepare a list of general safety procedures which will provide for adequate supervision and protection of your students.
4. Determine the cost of liability protection through organizations representing your teaching area and through a private insurance broker. Compare their benefits.

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## ACTIVITIES

1. The waiving of state immunity is a controversial issue in many states. Plan a debate based on the question: "Should states pass legislation which will waive the common law immunity which prevents individuals from bringing cases of tort liability against the state or its representatives?"
2. Analyze your liability and insurance protection in the state and district in which you teach or plan on teaching.
3. Prepare a list of general safety procedures which will provide for adequate supervision and protection of your students.
4. Determine the cost of liability protection through organizations representing your teaching area and through a private insurance broker. Compare their benefits.

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## Part Three-FUNDAMENTALS OF SAFE LIVING

In the third section of this book the fundamentals of accident prevention programming are applied to the various areas of human activity.

Included in Part Three are the following chapters:

12. Home and Family Safety,
13. Occupational Safety,
14. Public Safety,
15. Safety in Traffic and Transportation,
16. Fire Prevention and Protection,
17. Disaster Preparedness.

# Home and Family Safety

SOMEONE ONCE WROTE, "Your home may be your castle, but the enemy is not entirely outside the walls." A very thought-provoking statement, but one that should be carefully analyzed by every man, woman, and child. What is the significance of this 15-word phrase? Simply this: more accidents occur in and around the home than in any other place. A simple phrase, an elementary analysis of an accident problem that staggers the imagination of all who seriously consider the matter for even a brief period of time.

To verify the fact that the home is a hazardous place to live, work, and play, one simply needs to review the annual statistical reports on home accidents. Approximately 27,500 individuals are killed each year in home accidents, an average of 74 people a day. The National Safety Council reports that some 4.1 million people are injured in home accidents in an average year. These are injuries that are serious enough to require the services of a physician or to cause the loss of at least a half-day from work or school. Also noted is the fact that one out of every 40 home accident injuries results in some form of permanent impairment. For a place that is supposed to be a man's haven when he is in need of peace and quiet and the rest of the world seems to be out of tune, the above facts certainly cause the individual citizen to take note and wonder, "What is the home, my castle or my Waterloo?"

The U.S. Department of Health, Education and Welfare defines a *home accident* as "*any accident that occurs in a home or on home premises to members of the family, guests, or domestic servant.*" (Excluded are accidents during the course of gainful employment to persons other than members of the household or domestic servants, e.g., repairmen, meter

readers, delivery men, and the like.) The principal victims of such accidents are people under five and over 65. These are the persons who seem to fall prey to the various hazards that lurk in every room of the home. It appears that the relative helplessness of these two age groups accounts for their susceptibility. Contrary to common belief, the male under 16 years is involved in more home accidents than the female. However, for adults, accidents in the home are more frequent among women.

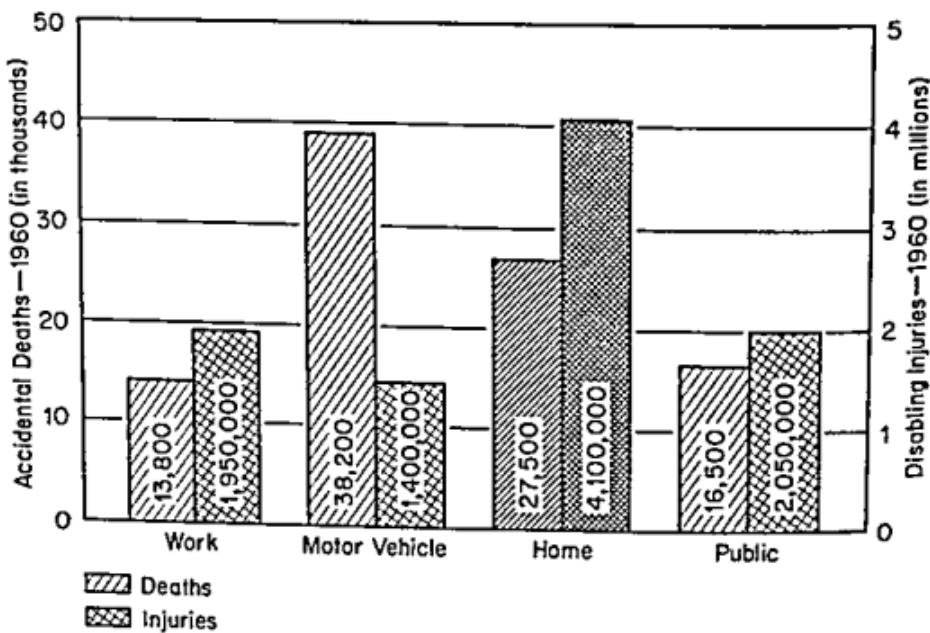


FIGURE 12:1. Comparison of accidental deaths and disabling injuries between Home and the other principal classes of accidents.

It is evident from a study of the home accident situation that this represents a serious problem and needs to be given more thought and emphasis by the family, school, and community. Since everyone lives in a home of some type, each should accept responsibility for the home safety of all persons who inhabit his premises. With new hazards being introduced into the home each year, measures must be taken to stem the trend in home accidents. The do-it-yourself movement, new household chemicals, and major family construction projects are examples of new fields in which many home accidents occur and, therefore, should serve as a challenge for all persons to be more concerned about safety at home.

## TYPES OF HOME ACCIDENTS

Americans are involved in all types of accidents around the home. Each room in the home and all places attached or adjacent to it are the scenes of numerous mishaps every year. The major types of home accidents result from fall, fire burns, suffocation, poisoning, firearms, and poison gases. The following is a discussion of these types of home accidents as reported in *Accident Facts*. (The statistical information quotes are yearly averages. For a complete analysis refer to Figures 12:2 and 12:3.)

Type of Accident	ALL AGES	0 to 4 Years	5 to 14 Years	15 to 24 Years	25 to 44 Years	45 to 64 Years	65 to 74 Years	75 Years and Over
Total Falls	27,500 12,200	6,100 450	1,400 80	800 20	2,200 200	3,400 950	3,300 2,100	10,300 8,400
Fires, burns, and deaths associated with fires	6,100	1,400	700	200	900	1,250	600	1,050
Suffocation—ingested object	1,700	1,300	30	20	80	100	70	100
Suffocation—mechanical	1,500	1,400	20	10	20	20	10	20
Poisons, solid or liquid	1,400	400	30	90	350	400	80	50
Firearms	1,200	60	330	180	250	250	90	40
Poison gases	800	40	60	110	200	230	80	80
Other	2,600	1,050	150	170	200	200	270	560

Source: Estimates by National Safety Council, based on data from the National Office of Vital Statistics and state health departments.

FIGURE 12:2. Deaths from Home Accidents by Type and Age, 1960.

(Courtesy National Safety Council)

## FALLS

In the minds of most family members, falls seem to be rather insignificant occurrences. Often it is not realized that falls represent the most serious threat to loss of life around the home. Each year close to 12,200 persons lose their lives in the home as the result of falls. This is a tragic number when most of them could have been prevented by a bit of intelligent thought and the simple repair or correction of some known hazard.

The very young and the very old seem to be the age groups that are

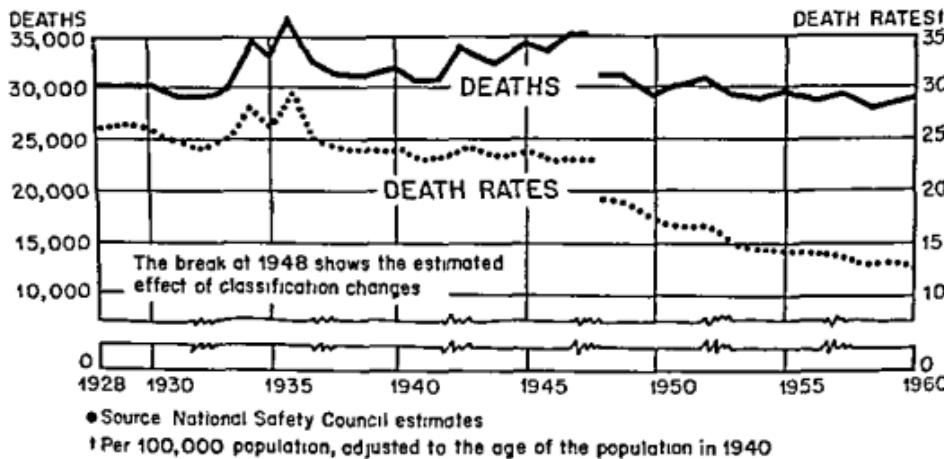


FIGURE 12:3. Home accidental deaths remain at a high peak year after year.

(Courtesy National Safety Council)

involved most often in fall accidents at home. Generally, individuals fall from one level to another, i.e., ascending or descending stairs, off ladders and roofs, or on the same level, i.e., on home floors, ground, and sidewalks. The bedroom, living and dining rooms, kitchen, bathroom, and stairs are the most dangerous places in the house. The greatest number of falls occurs in the bedroom with other rooms in the home being ranked in the preceding order, according to relative danger.

#### FIRE BURNS

Fire represents a very serious threat to the lives of all family members. Therefore, each family should earnestly attempt to eliminate home fire deaths and injuries. Apart from falls, this type of home accident is the second-most frequent accident occurrence in the home. Each year approximately 6,100 persons are killed in home fire accidents. It is interesting to note that susceptibility to fire burn accidents is greatest among preschool children and elderly age groups. Chapter 16 treats the subject of fire in detail.

#### SUFFOCATION

Approximately 3,200 persons die in suffocation accidents during an average year. They are classified as *suffocation-ingested objects* and *suffocation-mechanical*. In the former, death results from the accidental

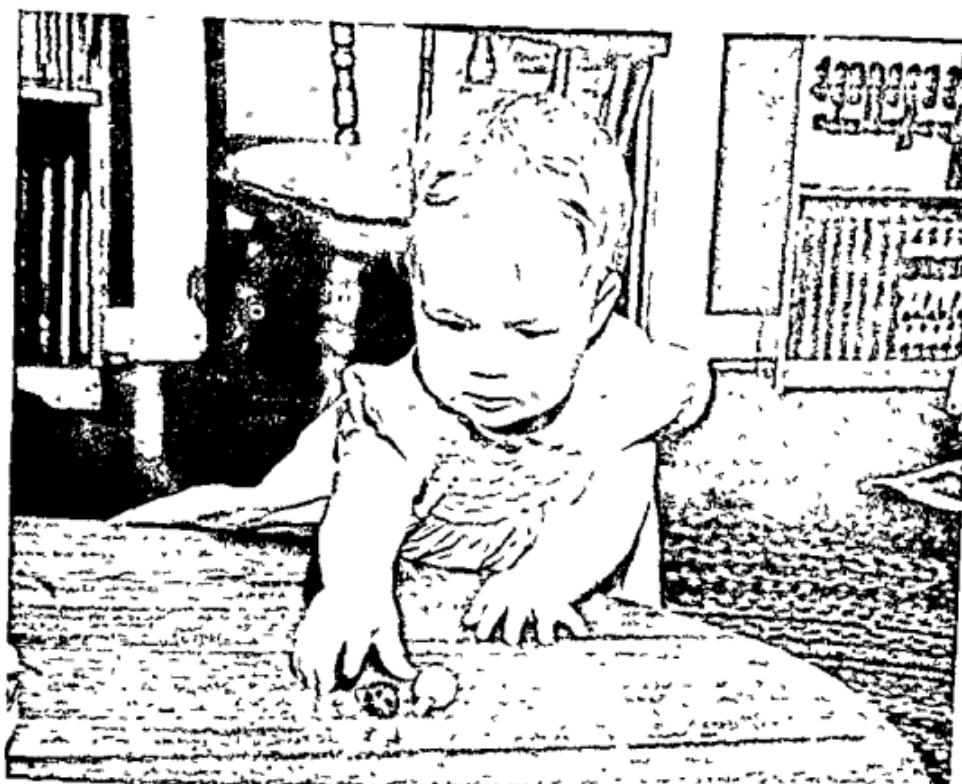


FIGURE 12:4. Numerous deaths of infants result from objects that bring on suffocation.

(Courtesy National Safety Council)

ingestion or inhalation of food or objects that cause obstruction of respiratory passages. Approximately 1,500 of these deaths happen to children under the age of four. *In the latter instance, deaths most often occur from smothering by bedclothes, plastic materials, and suffocation due to caves or containment in closed places, and mechanical strangulation.* In an average year approximately 1,500 deaths such as these occur, with nearly 1,400 in the under four age class.

#### Poisons

Each year there are an estimated 250,000 cases of accidental poisoning. Of this number, approximately 1,400 die. Most of these deaths are caused by aspirin and aspirin products, household preparations, and pesticides. Unfortunately, youngsters under the age of four are the most frequent victims of poison with one state reporting that 94 per cent of accidental

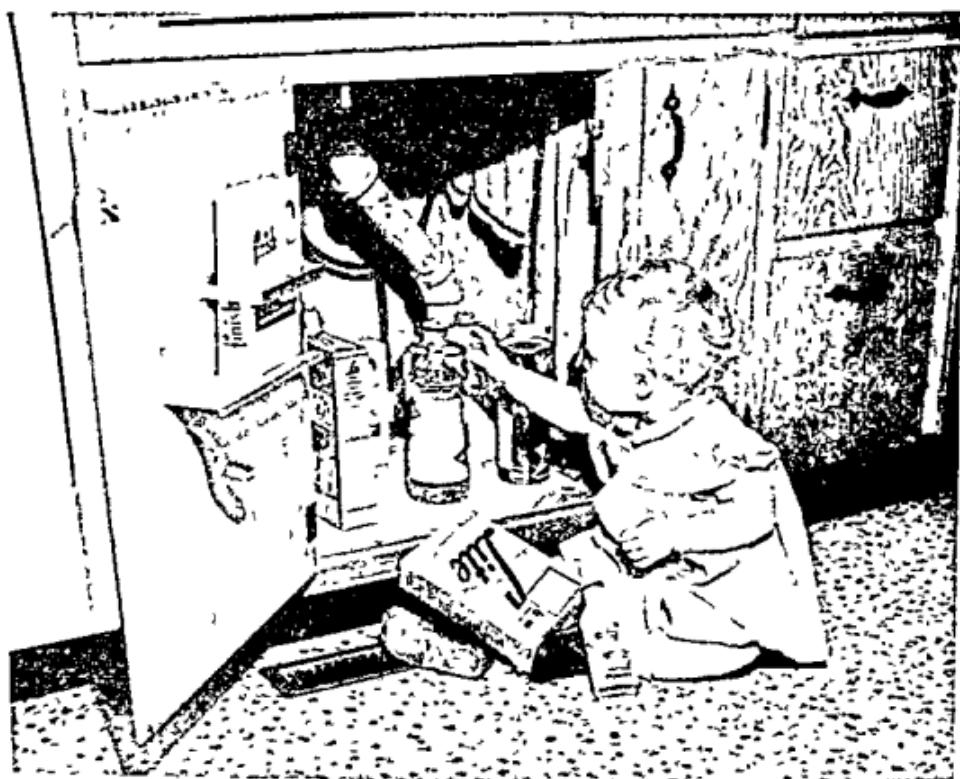


FIGURE 12:5. Poisons must be kept out of reach of younger family members.

(Courtesy National Safety Council)

poisonings were in this age group. Accidental poisoning does exist in all age classifications and must be guarded against throughout one's life.

#### FIREARMS

Firearm accidents in or on home premises cause approximately 1,200 deaths annually. The greatest number of these occur due to carelessness on the part of all members of the family. The "unloaded" gun takes numerous lives each year, while cleaning incidents and playing with guns account for an equal percentage of these unnecessary happenings in the home. It seems that the 5 to 14 year-old age group is involved in a significant number of these accidents while 25 to 44-year-olds and the 64-and-over age group account for a comparable number of such occurrences each year. Most home firearm accidents involve men and boys. Firearms in the



FIGURE 12:6. Improperly stored guns lead to numerous home accidents each year.

(Courtesy National Safety Council)

home are indeed a hazard to life and should be handled and stored with caution.

#### Poison Gases

Deaths due to gas poisoning take place at an average rate of two per day. In a typical year some 800 Americans lose their lives from this cause.

Most such deaths are due to carbon monoxide, i.e., incomplete combustion involving heating equipment, cooking stoves, and idling motor vehicles. Adults in the age categories of 25 to 44 and 45 to 64 seem to be the most frequent victims of gas poisoning, but a substantial number of lives are taken each year in all other age groups. This is an accident problem involving the entire family.

#### OTHER HOME ACCIDENTS

Apart from the accidents discussed above, there are other important types of home accidents that need to be recognized as definite threats to the family group. There are 2,600 home deaths occurring annually due to drowning, electrocution, burns from hot substances, and blows sustained from falling objects. During a typical year the under four and the 65-and-over age groups are most frequently involved.

#### THE DYNAMICS OF HOME ACCIDENTS

Individuals are involved in home accidents for a variety of reasons. However, regardless of the reason, it is possible to reconstruct each accident and identify a sequence of events or factors that contributed to the accident. In a very real sense, this sequence may be referred to as the "dynamics of home accidents." The following is a general discussion of Figure 12:7 supplied by the U.S. Department of Health, Education and Welfare.

#### BACKGROUND FACTORS

There are many background factors that can be the genesis of a home accident. In general, these factors may be identified as unsafe persons and unsafe conditions. These two in combination are related to the education, experience, and judgment of the individual along with the condition of the home. These factors form the behavior pattern displayed by the person within a given environment.

#### INITIATING FACTORS

The second step toward causing an accident is concerned with (1) a change in the normal daily pattern of the individual, plus (2) the presence

## The Dynamics of Home Accidents

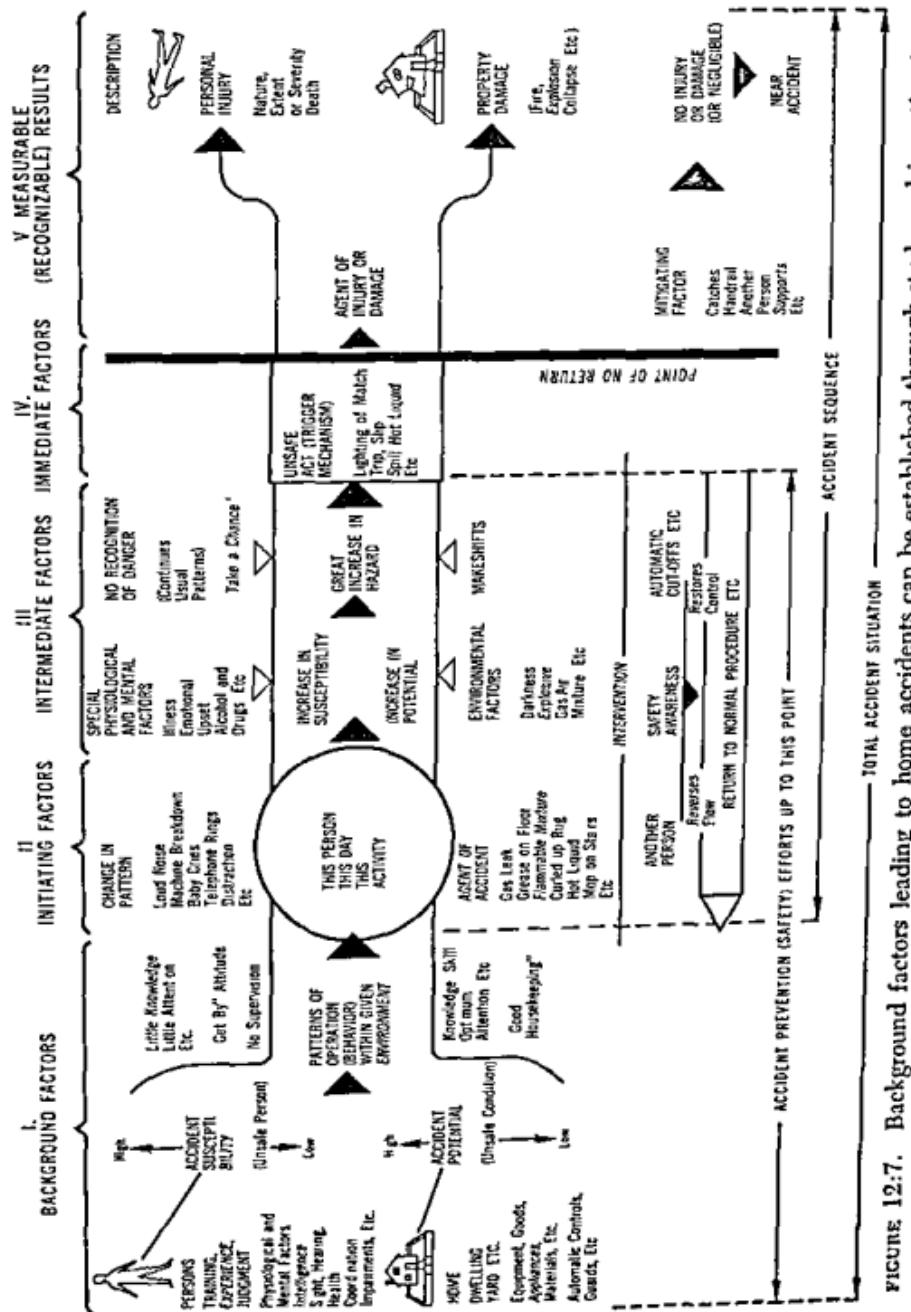


FIGURE 12.7. Background factors leading to home accidents can be established through study and investigation.

of some agent of accident, i.e., loose rug, gas leak, obstacle on stairs, and so forth. For an accident to occur, these must involve the person on a particular day and a specific activity. At this point it is still possible for the person to dispose of the accident circumstances being structured by the intervention of another person or the return to a normal procedure.

### INTERMEDIATE FACTORS

If the individual continues with the accident-producing behavior pattern, at some point certain physiological, mental, and environmental factors tend to increase the susceptibility of the individual. These conditions also enhance the accident potential. Such factors as illness, emotional upset, alcohol, drugs, darkness, and explosives are the most common elements that tend to increase the possibility of a home accident. In general, such conditions are not recognized and attempts to compensate are only token efforts.

### IMMEDIATE FACTORS

At this point the individual commits an unsafe act. This "trigger mechanism" could be one of many acts. Common examples are the lighting of a match, tripping or slipping on a surface, or the spilling of a hot substance. When such an act is performed, the person has gone to the "point of no return." In other words, an accident will invariably result.

### MEASURABLE RESULTS

The results of going beyond the point of no return can be measured as either personal injury or property damage. The severity of each of these is determined by the circumstance of the moment. In one instance death may result, while in other cases severe or minor injury may be the consequence.

**MITIGATING FACTORS.** There is a possibility that something might develop at the last moment to dispose of the accident in the making. Another person could perform an act that would stop the accident sequence, or the individual could catch a handrail or another person and personally avoid the accident. In such instances the individual should be very thankful that something "broke" the accident sequence that could have resulted in death or a lifetime of permanent impairment.

## MOTHER—THE HOME SAFETY ENGINEER

It may be a novel thought but the mother is the "safety engineer" in the home. Probably in no other place does the mother play such an important role in matters of safe living. Family safety takes on added significance for the mother when it is recognized that about one third of all families have children under six years of age. As the many chores performed by the lady of the house are analyzed, it is evident that she is directly responsible for the "environmental, service, enforcement, and instructional" safety programs of the family. She also establishes policies and rules and regulations that guide the family in matters related to safe practices.

Families differ greatly relative to educational, religious, socioeconomic, and environmental backgrounds. These factors influence to some degree the accident experience of the family group, and must be given consideration in the development of the "family accident prevention program." As the family grows in numbers and develops from infancy to adulthood, the accident problems of the family change. The mother in all probability will be the first to understand and deal with these problems in her effort to keep the family free of accidental injuries. Let's explore in more detail some of the accident prevention tasks of mother, the home safety engineer.

In general, the mother sets the pattern and standard of housekeeping. If such standards are high and all family members are made aware of them, in all probability many accidents related to poor housekeeping will never have the opportunity to occur. If an orderly and safe pattern of housekeeping is established as soon as possible, when children enter the household in later years such standards will be a "natural" part of their growing up.

It is usually the responsibility of the homemaker to select the household furniture and equipment. Such selections should be made with due consideration for the safety of all family members. Many environmental hazards will never materialize if items chosen for the home are selected with safety in mind. Another task that the mother has is the supervision of various household chores and activities. This includes those that are hazardous as well as those that are relatively safe. This responsibility should not be taken lightly, and every effort should be made to see that all activities, especially those involving hazards, are properly supervised.

Mother also is the teacher of the family. This duty involves the safety

instruction received by each member of the family, particularly the youngsters. Generally, this is one area where the lady of the house falls short. In view of the many different activities that claim the attention of the family, it is very difficult for any one person to have readily available all the knowledge and information necessary to give adequate instruction that is pertinent and meaningful. It appears that the offering of a high school course in general safety education would be an excellent way to prepare the "prospective mother" to cope with family accident problems. Moreover, the stressing of home accident problems in home economic classes would appear to be a very good way to give the high school student an insight into many of the potential accident problems in her future.

Perhaps the most difficult charge of the "home safety engineer" is that of enforcement. The extent of the enforcement function of the mother is complex and hard to define. The disciplining of children seems to be the fundamental role related to enforcement of home safety practices. Firm home discipline is, in general, the basis for developing attitudes of respect for one's safety. However, this should not be confused with irregular or overly strict discipline which tends to produce unfavorable results in developing respect for the safety of self and others. Indeed, the enforcement responsibility of the mother should be rigidly carried out. Nonetheless, an air of fair play and a pleasant attitude should accompany such action.

Another responsibility of the mother is the setting of safety policies and rules and regulations for the family. This function is closely allied with the enforcement role. Ideally, such developments should be a "family council" affair. However, most often the mother finds herself in the unique position of establishing rules of conduct that govern the actions of her family group.

Last, but certainly not least, of mother's assignments is the applying of first aid measures. There will be many opportunities for the parent to repair the numerous cuts, bruises, and bumps that the various members of the family sustain from time to time. Before emergency care can be effectively applied, mother must see that first aid supplies are available. In the application of first aid, it is important that such action be correctly and expertly rendered. If an improper substance or method is applied, it is possible that the injury will become more acute. Therefore, it is necessary that the mother (as well as the father) be well prepared to render first aid treatment when needed.

## DO-IT-YOURSELF

In recent years there has been a movement under way, in and around the home, that has tended to increase and complicate the home accident problem. Due to an upsurge in the number of people desiring to build and repair household items of all sizes, shapes, and descriptions, the home accident problem becomes more difficult to cope with each year. It is estimated that there are approximately 12 million persons engaged in do-it-yourself activities.

Approximately 650,000 persons in the United States sustain disabling injuries annually while doing home repairs and building various articles. The multimillion dollar home workshop business is testimony to the vast involvement of people in the do-it-yourself movement. In general, do-it-yourself accidents are associated with the building of furniture, replacing window panes, interior and exterior painting, installing or removing storm windows, repairing chimneys, erecting TV aerials, pruning trees, and repairing gutters and roofs.<sup>1</sup> The misuse of power tools seems to be the big problem in these situations. A vast majority of these accidents are the result of using improper or defective equipment, including hand tools, and the lack of sufficient knowledge of how the job may be performed safely.

## SAFE PRACTICES AT HOME

The home is a dangerous place due primarily to unsafe behavior on the part of family members. Moreover, the lack of an orderly home is a prevalent factor in accident causation around the home, apart from the lack of proper maintenance of the home structure, floors, steps, and general environment.

A great deal can be done to safeguard the family against tragedy in the home. There are many simple, safe practices that will protect family members if adhered to day after day. Those safety measures that apply to the home will also be applicable when the individual finds himself in public places, at school, or on the job. Figure 12:8 presents a detailed analysis of the various safe practices that should be in vogue in every home across America. It is evident after a casual study of this figure that

<sup>1</sup> American Mutual Liability Insurance Company, *Watch*, Vol. XII, No. 2 (Boston: The Company, 1955), p. 17.

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## SAFE PRACTICES AT HOME

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### KITCHEN

1. Maintain clean, dry floors at all times.
2. Keep handles of cooking utensils turned inward on the stove.
3. Use a sturdy ladder when reaching for high cabinets.
4. Keep matches in a metal container and away from children.
5. Keep curtains secure to prevent blowing over flame.
6. Keep electrical appliances away from sinks containing water.
7. Keep knives and scissors sheathed and away from small children.
8. Store cleaning fluids and strong washing compounds out of the reach of children.
9. Keep spilled grease wiped from stoves and floors.

### BATHROOM

1. Use nonskid mats in showers, tubs and on the floor and use a grab-rail.
2. Mark poisons and keep out of children's reach.
3. Insulate all electric pull-chains.
4. Store and dispose of razor blades in closed containers.
5. Provide a stool for small children using the wash basin.
6. Avoid using electrical appliances.
7. Have a good first-aid kit available.

### STAIRWAYS AND HALLS

1. Light all stairways and halls adequately.
2. Provide railings and banisters and keep them in good repair.
3. Fasten rugs and carpeting securely.
4. Keep stairways and halls free of toys, brooms, pails, and all other loose articles.
5. Use gates at head and foot of stairways to protect small children.

### YARD

1. Keep all walks and stairs free of ice and snow.
2. Burn all rubbish in a wire container away from buildings.
3. Keep clotheslines above head height when not in use.
4. Fill lawn holes and open wells.
5. Keep yard free from broken glass, rusty wire, and other dangerous litter.

### BEDROOM

1. Maintain windows at least 30 in. from the floor or equip with guard rails.
2. Protect children from falling out of bed.
3. Turn off or properly adjust heating pads and other electrical appliances before going to bed.
4. Take care as to where shoes and clothing are left to prevent falls.
5. Never smoke in bed.
6. Avoid entering closets with a lighted match or candles.
7. Turn off gas heaters before going to bed.
8. Install lamps or light switches near beds to be reached safely in the dark.

### LIVING ROOM

1. Provide a snug-fitting metal screen for the fireplace.
2. Arrange furniture to allow for passage in the dark.
3. Anchor all rugs with nonskid materials.
4. Keep all chairs and other furniture in good repair.
5. Provide safe disposal for cigarette and cigar butts.
6. Inspect all flues, pipes, and chimneys regularly.
7. Keep electric cords clear of passageways.

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FIGURE 12:8. Safe Practices at Home.

## SAFE PRACTICES AT HOME (cont.)

## ATTIC, BASEMENT, AND GARAGE

1. Dispose of all rubbish and inflammable litter on a regular schedule.
2. Keep each place well lighted.
3. Provide metal containers for ashes.
4. Store all sharp tools out of the reach of youngsters.

5. Open garage doors when running vehicle motor inside.
6. Keep all ladders in good repair and stored safely.
7. Protect all electric circuits with proper size fuses.
8. Keep flashlight handy to inspect gas meter, fuse box, or oil heater.

FIGURE 12:8. Safe Practices at Home (cont.)

the safe practices related to the home are based upon fundamental common-sense safety measures designed to conserve a valuable human resource, the family.

## FAMILY SAFETY

In recent years the concept of family safety has emerged. This concept has developed due to the increase in the number of activities participated in by the family group. Increased mobility allows participation in picnics, vacations, camping, and recreational activities that place members of the family in various accident-producing situations. With such participation by the family, the use of the motor vehicle containing family groups has increased proportionately. The result is an upsurge of fatal traffic accidents involving whole families.

The safety of the family should take on new meaning for parents as activities participated in by the family group continue to multiply. The development of family accident prevention programs seems to be the best approach to the curtailing of accidental deaths and injuries suffered by the family.

## THE FARM FAMILY

Families that reside on farms are exposed to essentially the same hazards as urban groups, plus a variety of potential injury agents peculiar to the rural environment. The farm is known to be one of the most dangerous places to live and work. Accidents kill one farm resident every 45 minutes, and every 37 seconds a farm resident is involved in a disabling

injury. In summary, it can be stated that farming is one of the world's most dangerous occupations and that the rural home is as accident-susceptible as the urban residence. (A farm is now defined as a place having 10 or more acres and selling 50 dollars or more of agricultural products annually, or having less than 10 acres but selling 250 dollars or more of agricultural products annually.)

## TYPES OF FARM ACCIDENTS

Today the farm resident is principally involved in six different types of accidents. They are falls, motor vehicle, machinery, objects, animals, and sports. The following is a discussion of these types of rural accidents based upon National Safety Council facts and a recent study conducted by the Agricultural Extension Service, Washington State University.<sup>2</sup>

### FALLS

The rural resident seems to be as susceptible to falls as the urban resident. Farm people have many occasions to fall, for their work involves various buildings and machinery. The farmer climbs up and down the corn picker, tractor, wagon, and corn crib many times a day during the corn-picking season. During hay-making time, the farmer is up and down the hay rack, barn mow, or hay stack. This is true of the combining season also, as well as of many other farm activities. These activities often include the entire farm family which increases the number of opportunities for falls. The farm buildings and machinery often are repaired by the rural resident himself, meaning hours of off-the-ground work. Falls represent the greatest number of accidents experienced by the farm person. For the most part, these accidents result in temporary conditions, but many of them cause permanent impairment.

### MOTOR VEHICLE

Approximately 45 per cent of all fatal accidents to farm residents are the result of motor vehicle accidents. The farm resident tends to drive at speeds below the average for vehicles using the same highway; therefore, he creates a moving traffic hazard. Many rural traffic accidents on primary

<sup>2</sup> P. Roy and P. K. Fanning, *Accidents to Farm People In Washington* (Pullman Agriculture Extension Service, Wash. State Univ., 1960).

roads involve slow-moving, tractor-drawn machinery. During a recent year, 5,100 farm residents met death on the highways, with 180,000 receiving disabling injuries. The death rate per 100,000 farm residents is 24.8 as compared to the national average of 5.3.

#### MACHINERY

A recent study concluded that 11 per cent of all fatal accidents to rural residents involved farm machinery. A current study in Indiana points out that approximately 15 per cent of all non-fatal accidents involve machinery used on the farm.<sup>3</sup>

No doubt the increased usage and the complexity of newer equipment account for numerous accidents involving farm machinery. This calls for an attendant increase in the type of education needed prior to the use of the equipment and for increased caution on the part of individual farm-hands.

#### OBJECTS

The rural worker handles many different types of objects that have the potential for falling or being dropped on the individual. The storing of bales of hay in barns, the lifting of heavy sacks of feed and other materials are constant sources of hazard to the farmer. Since the farm worker is involved in numerous accidents with falling objects each year, farmers should be more cautious about the manner in which all items are hoisted or lifted for any purpose.

#### ANIMALS

In recent years the use of farm animals has significantly decreased. However, in those instances where the raising of livestock is a major share of income productivity, animals do represent a threat to the lives of farm families. There are still numerous places where animals are used for work purposes, and they must be treated with caution. The basic principle for rural workers to follow is "to respect all animals" as a potential hazard to one's well being.

<sup>3</sup> National Safety Council, *Farm Safety Review* (Chicago: The Council, Sept.-Oct. 1960), p. 6.

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## SAFE PRACTICES ON THE FARM

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### POWER MOWERS

1. Never allow young children to operate a power mower.
2. Never operate a power mower on wet grass where traction is not good.
3. Clean the mowing area of all debris.
4. Turn mower ignition off before adjustments are made.
5. Never fill gasoline tank while engine is running. Permit engine to cool first.
6. Make certain that rotary mower blade is secured and does not extend beyond blade enclosure.

### MACHINERY, EQUIPMENT, AND TOOLS

1. Keep all machinery, equipment, and tools in first-class condition.
2. Use guards and other protective devices provided for machinery.
3. Turn off power before any adjustments are made on machinery.
4. Never allow small children to operate or play on power equipment.
5. Avoid wearing loose fitting clothes.
6. Never operate machinery on dangerous inclines or near steep banks.
7. Pull equipment from draw bar, never from the axle.
8. Never climb over or around machinery when it is in operation.
9. Store machinery, equipment and tools in a definite place.
10. Make certain that all hammer and axe heads, plus handles, are secure and in good condition.

### FARM HOME

1. Keep all stairways clear of boxes, buckets, mops, and tools at all times.
2. Keep porches, steps, and stairways in good repair.

3. Keep sharp knives in a rack or separate compartment from other knives and tableware.
4. Mop up spilled grease or water immediately.
5. Avoid placing containers of hot water or hot fat where they may be easily overturned.
6. Provide a special container for broken glass, etc.
7. Keep guns unloaded and locked up away from small children.

### BUILDINGS AND FARMYARD

1. Keep the farmyard clear of tools, rubbish, waste, rakes, and other small equipment.
2. Enclose water tanks, wells, cisterns to protect small children.
3. Maintain grounded lightning rods on all buildings.
4. Remove nails from all surplus lumber.
5. Use well-built ladders and steps and keep them in good repair.
6. Maintain adequately lighted haymows and locate all switches in convenient places.
7. Avoid storing loose materials in enclosed overhead areas.

### TRACTOR

1. Keep tractor wheels well spread to avoid tipping.
2. Disengage clutch when starting engine.
3. Check the power take-off for disengagement.
4. Ride on seat in safe manner.
5. Allow wide radius when turning corners.
6. Set brake when dismounting tractor.
7. Climb off tractor cautiously—never jump.

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FIGURE 12:9. Safe Practices on the Farm.

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SAFE PRACTICES ON THE FARM (cont.)

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8. Operate tractor at safe speed.
9. Allow no extra riders on tractor when operating.

**CORN PICKER**

1. Adjust picker before going into the field.
2. Shut off tractor before attempting to work on any part of the equipment.
3. Operate at safe, slow speed.
4. Never reach into moving parts of the picker to remove plugged corn stalks.
5. Shut off engine and disengage the power take-off before leaving the tractor.
6. Allow only mature workers to operate corn picking equipment.
7. Do not allow children to play on corn picker.

**MOTOR VEHICLE**

1. Observe all traffic laws, signs, and markers.

2. Maintain speeds similar to other roadway users.

3. Make certain that there is two-way vision where driveway or lane enters the highway.

4. Pull completely off the highway when forced to stop.

5. Keep arms inside the vehicle—truck or passenger car.

**FIRE**

1. Keep an emergency water supply available at all times. (Pond, barrels, or hose attachment to water system.)

2. Store boxes of sand in all buildings to fight oil and gasoline fires.

3. Store all oil and paint rags in metal containers.

4. Keep weeds, brush, and old lumber cleared away from buildings.

5. Store gasoline in isolated tank.

6. In the absence of an organized fire department, make arrangements with neighbors to come in case of fire.

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FIGURE 12:9. Safe Practices on the Farm (cont.)**SPORTS**

With the increased mobility of the farm family, it has had more opportunities to participate in various recreational activities. With the mechanization of the work tasks, time is now available for rural families to pursue such endeavors. The rural family has indeed been taking advantage of this leisure time. However, it is noticed that with increased participation there is proportionate growth in the number of farm deaths due to hunting, water, and sport accidents of all kinds. Apparently, the farm family is not using this "recreational" time advisedly.

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SAFE PRACTICES ON THE FARM

In order to combat the continued occurrence of farm accidents, renewed interest and enthusiasm is needed. Today all agencies, local, state

and national, that have a specific concern for the safety of rural families are developing programs to help lower the death and injury records of the rural population. Among those doing outstanding jobs in this regard are the 4-H Clubs, FFA chapters, state and local agricultural groups, farm bureaus, and various citizen organizations.

There are many accidental deaths and injuries among farm residents and workers that are due in part to the unique conditions of the farm environment. Studies have revealed that a large number of farm accidents are the result of carelessness, failure to take safety precautions, a lack of knowledge of safe practices, and exposure to hazards in the handling and operation of the more complex, modern farm machinery. Figure 12:9 lists safe practices which, if followed, will contribute to a reduction of farm accidents.

## SUMMARY

The home, either urban or rural, is without question a most dangerous place. This is an established fact. The question is: Need such a condition exist? The simple answer is, no. Homes need not be hazardous places for families to live, work and play.

Most of the accidents that involve the family are due to individual neglect or carelessness. If family members would exercise due care and practice fundamental rules of safety, the number of home accidents would decrease sharply. The concept of family safety has developed in recent years to emphasize the need for family safety education and accident prevention programs.

Families that live in a rural environment are involved in accidents as frequently as their urban neighbors. The basic difference between the types of accidents experienced by rural and urban families is due to environment and exposure factors. In other words, the rural family is involved in many of the same types of accidents as the urban one, but it also has certain types of accidents in the rural setting that do not occur in the city neighborhood. It needs to be recognized by all that the home is a dangerous place, but by the same token this need not be the case.

## ACTIVITIES

1. Make a comprehensive inspection of either a home or school premises and develop a thorough report on the hazards located, including recommendations for correction.

2. Develop a home and family safety program using the National Safety Council's Home Safety Inventory as the basis.
3. Contact the farm organizations in your area and make an analysis of the safety program sponsored by such groups.
4. Prepare a teaching unit on home and family safety that could be taught to a senior high school class.
5. Develop a list of farm home hazards especially dangerous to the elementary school student.

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## Occupational Safety

SERIOUS THOUGHT was devoted to the problem of industrial safety during the first decade of the present century. The various hazards inherent in industrial occupations created by the so-called industrial revolution led to the recognition of social responsibility by employers and governmental agencies. The need for improving the lot of industrial workers enhanced the development of an accident prevention doctrine that encompassed the principles of safe environment and behavior.

With the organizing of the National Safety Council in 1912, occupational accidents began to decrease. However, the annual toll of occupational injuries and deaths is still significant. This total number of occupational accidents has hovered around 2 million since the end of the Second World War. Of this number approximately 13,800 are deaths and 1,950,000 are disabling injuries. These figures have tended to remain constant in recent years despite the fact that the number of work-hours has increased. In addition to the losses in lives, there is a yearly loss of work-time by injured employees that reaches astronomical proportions. In a recent year, approximately 230 million man-days were lost due to injuries of all types. Moreover, the cost of these accidents exceeded 4.4 billion dollars.

The waste in human and material resources constitutes a vital national problem. Invariably a large proportion of those injured or killed are persons with special skills, rare abilities, excellent training, outstanding experience, or valuable knowledge. The losses in cost of training and the interruption of production are the major reasons that industry is concerned about keeping the worker safe on the job. Although another workman replaces and becomes as proficient at the job task as the disabled worker, each permanent injury means the loss of some of the experienced worker's productive capacity for the rest of his working career.

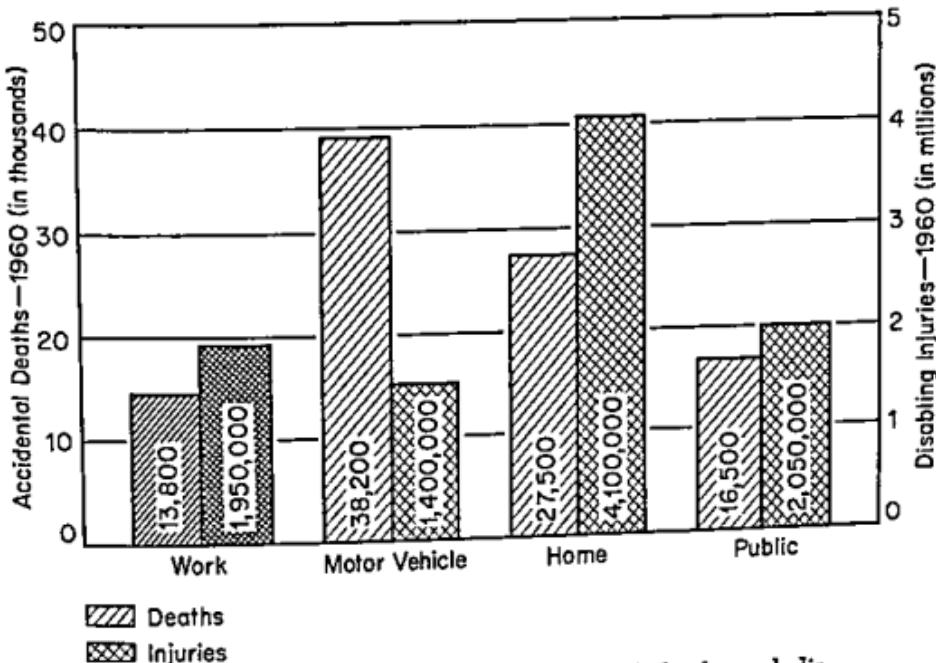


FIGURE 13:1. Comparison of accidental deaths and disabling injuries between Work and the other principal classes of accidents.

A significant fact today is the knowledge that more workers are being injured and killed while off the job than while at work. About seven out of 10 accidents occur off the job. The cost of such accidents is an incentive for industry to develop programs of accident prevention that will help keep the worker accident-free while off the job. In large measure, industry's future success to operate at a profit depends on the elimination of off-the-job accidents.

#### RESPONSIBILITY AND PROGRAM ORGANIZATION

Accident prevention is a major responsibility of management. The creation of a safe work environment and development of a safety-minded efficient operation are economic, legal and moral obligations of the top executive in every business or industry. Every type of work involves some element of hazard; therefore, efforts must be made to safeguard the lives of all through proper attention to safety matters by high company officials.

## ELEMENTS OF SAFETY ORGANIZATION

It is vital that every industry have an accident prevention program. Through industrial safety programs the employee is assured of a safe work environment, and the employer is assured that the worker will react and conduct himself in a safe manner. A smooth-functioning accident prevention program is the result of adequate organization. The successful industrial safety program usually is built on the elements of safety organization discussed below.

**MANAGEMENT LEADERSHIP.** The accident program of each plant must have the support of top management before the program is acceptable to the employee. Therefore, the top executive must determine to what extent his company will organize an attack on accidents. This decision is important and must be made known to all employees. The determination to eliminate accidents should become an integral part of company policy, with a clear statement of policy being announced to supervisory and management staff and employees.

**RESPONSIBILITY ASSIGNED.** Responsibility to provide guidance and direct leadership for the conduct of the accident prevention program should be assigned to a single person. Most often a safety director is so designated. In smaller plants a safety committee can assume leadership for the planning and conduct of the safety program. The safety director should be given authority to carry out the policies of the company. To accomplish this, he should be attached administratively to a high-level office that is respected by the employee.

**WORK CONDITIONS.** Safe work conditions are necessary if the employee is to operate on the job with a feeling of freedom and confidence. The inspection of the work environment is generally the best method to ascertain potential hazards and pave the way for their correction. Periodic inspections should be conducted, with detailed records being kept to determine top-priority hazardous conditions that should be removed.

**TRAINING PROGRAM.** There are two basic training programs needed in every plant. One is organized for the benefit of supervisors and other plant management personnel. The second is a training program for the employee. In each instance the objectives are to outline the nature and extent of the safety program. An attempt is made to teach the supervisor how to supervise with maximum effectiveness, while an effort is devoted to teaching the employee safe practices related to his specific job.

**ACCIDENT RECORD SYSTEM.** A fundamental element in the organization of an industrial safety program is the establishment of a good accident

record system. This eliminates guesswork relative to accident experience, cost, and other specific accident data. A standard form should be used in order to obtain accident information deemed necessary by the company. These data should be kept in a permanent file to answer questions at a later date and to serve as a legal basis for each accident case.

**MEDICAL AND FIRST-AID SYSTEM.** Due to the frequency and potential severity of industrial accidents, a staff physician should be employed. The number of employees will determine the number of physicians and nurses necessary to provide adequate care. Since the majority of accidents will require minor treatment, a sound first-aid center is needed. A facility properly staffed and equipped with first-aid supplies should be available as a valuable link in the industrial safety program. First-aid reports should be kept on all injuries in order to compile injury data. These data would be used to determine the frequency and severity rates of the industry. The *frequency rate* is the number of disabling injuries per million man-hours worked, while the *severity rate* is the number of days charged or lost per million man-hours worked.

**PERSONAL RESPONSIBILITY.** A basic objective of the industrial accident prevention program is impressing upon the individual the necessity of accepting responsibility for personal safety. This is accomplished through a sound accident control program that maintains the interest of the employee. If the safety director is successful in accomplishing this end, the battle against accidents is half won. A good program that motivates people to be concerned over personal safety is a fundamental element in the organization of a successful accident prevention program.

### CAUSES OF OCCUPATIONAL ACCIDENTS

Thorough study of occupational accidents discloses that they are caused by either (1) unsafe conditions, or (2) unsafe personal acts. In general, accident investigation has shown that most accidents are the result of more than one factor. Frequently, several faulty, underlying conditions can be identified. It is desirable to determine both the typical unsafe condition and the unsafe personal act, investigate each and identify the factor that may have been responsible for the accident.

#### UNSAFE PHYSICAL CONDITIONS

Unsafe physical conditions are accident factors related to faulty planning, defects in conditions, errors in design, or omission of essential safety

requirements for maintaining a hazard-free environment. Simonds and Grimaldi identify the following seven categories of unsafe physical conditions:<sup>1</sup>

1. Inadequate mechanical guarding.
2. Defective condition of equipment.
3. Unsafe design or construction.
4. Hazardous process, operation, or arrangement.
5. Inadequate or incorrect illumination.
6. Inadequate or incorrect ventilation.
7. Unsafe dress or apparel.

#### UNSAFE PERSONAL ACTS

Behavior that leads to accidents is identified as unsafe personal acts. Personal acts that result in accidents are classified by Simonds and Grimaldi under the following headings:<sup>2</sup>

1. Working unsafely.
2. Performing operations for which supervisory permission has not been granted.
3. Removing safety devices or altering their operation so that they are ineffective.
4. Operating at unsafe speeds.
5. Use of unsafe or improper equipment.
6. Using equipment unsafely.
7. Horseplay, teasing, abusing, and so forth.
8. Failure to use safe attire or personal protective devices.

#### SAFE PRACTICES

The organization and conduct of an occupational safety program in business and industry utilize various methods and procedures. The numerous approaches are in reality safe practices related to making the environment hazard-free and prevention of unsafe personal acts. The following is a brief analysis of these considerations.

#### PHYSICAL PLANT

Within every plant, large or small, there are certain physical attributes

<sup>1</sup> R. H. Simonds and J. V. Grimaldi, *Safety Management* (Homewood, Ill.: Irwin, 1958), pp. 199-200.

<sup>2</sup> *Ibid.*, p. 200.

that determine a safe work environment. For the most part these may be identified as plant layout, including location of equipment, good house-keeping, and lighting.

The safe and efficient movement of in-plant operation depends in large measure on the pattern of fixed equipment. If a plant operator desires to check the movement from one phase of an operation to another, he draws a schematic diagram of the total process or conducts a time-and-motion study for efficiency and safety. As a rule, plant operations can never be safe if good housekeeping is not practiced. Every worker should be responsible for maintaining order in his own work area, and the necessary housekeeping equipment should be available to the work force.

#### STORAGE AND HANDLING

It is estimated that about 35 per cent of all on-the-job accidents result from materials handling. The basic causes of such accidents are principally unsafe work habits, improper lifting, and failure to wear personal protective equipment. About 50 per cent of the handling accidents are the result of improper lifting. Most susceptible are the new or untrained workers. Adequate storage space is necessary if materials are to be available on an efficient basis. This can be accomplished through the use of bins, racks, skids, and supports of various kinds.

#### MACHINE GUARDING

A basic way of protecting the employee in his job environment is by placing guards around hazards. Machine guards tend to enhance the operator's confidence and, therefore, allow him to increase his productivity.

#### TOOLS

The misuse of common hand tools and power equipment are frequent sources of injury to the industrial employee. Tool accidents occur because very often the assumption is that "anybody" knows how to use the tools safely and efficiently. Hand tools are the source of 6 to 10 per cent of all compensable industrial injuries. When power tools are used, the worker should receive instruction in their use, storage, and handling. Electric saws, drills, grinders, and pneumatic impact tools are among the power equipment commonly used by industrial workers.

## SPECIAL HAZARDS

Apart from the typical hazards that exist in an industry, there are special hazards that need attention in the development of safe practices. Welding operations, for example, expose employees to eye injuries, burns, metal-fume poisoning, and others. There are also many electrical hazards in industry. Employees frequently forget that 110 volts may be more deadly than higher voltages. Most electrical equipment is designed for a

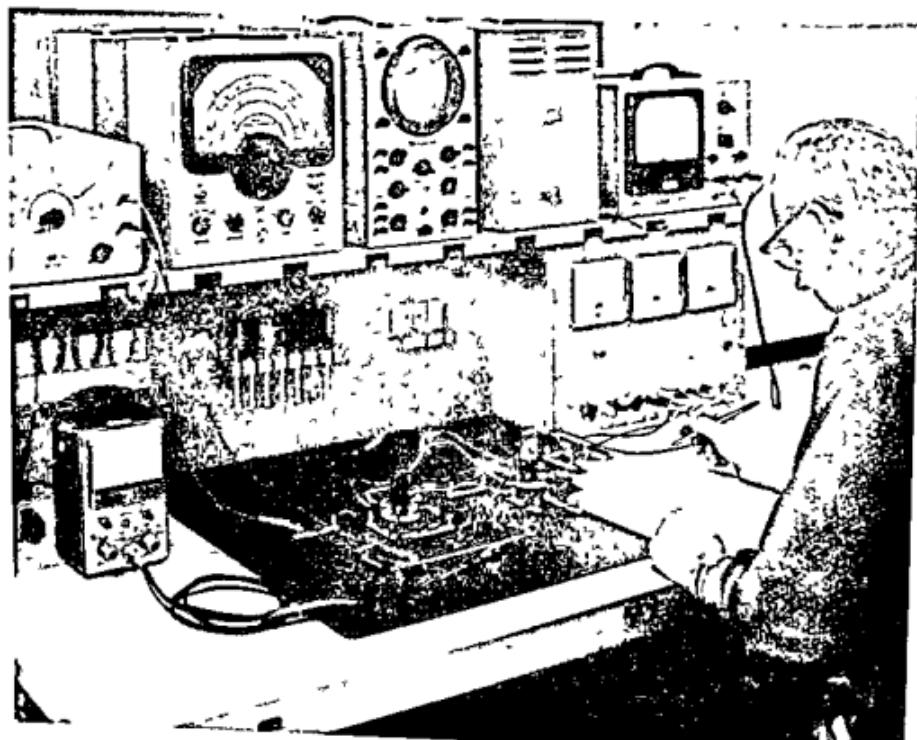


FIGURE 13:2. Research activities in industrial electronics as well as other phases of industry require optimum adherence to safety procedures.

(Courtesy San Jose State College)

specific service and will perform satisfactorily when used for specified operations. In all cases, equipment should be grounded and meet specifications of the National Electric Code. The use of solvents and chemicals in industry represents other special hazards from which the employee needs protection.

## FIRE PREVENTION AND PROTECTION

Each year there are over 100,000 building fires involving business and industrial operations. These account for over four hundred million dollars loss each year and obviously represent a serious problem that needs considerable attention. In order to reduce the fire hazard it is necessary to consider (1) fire prevention, and (2) fire detection and control. Fire

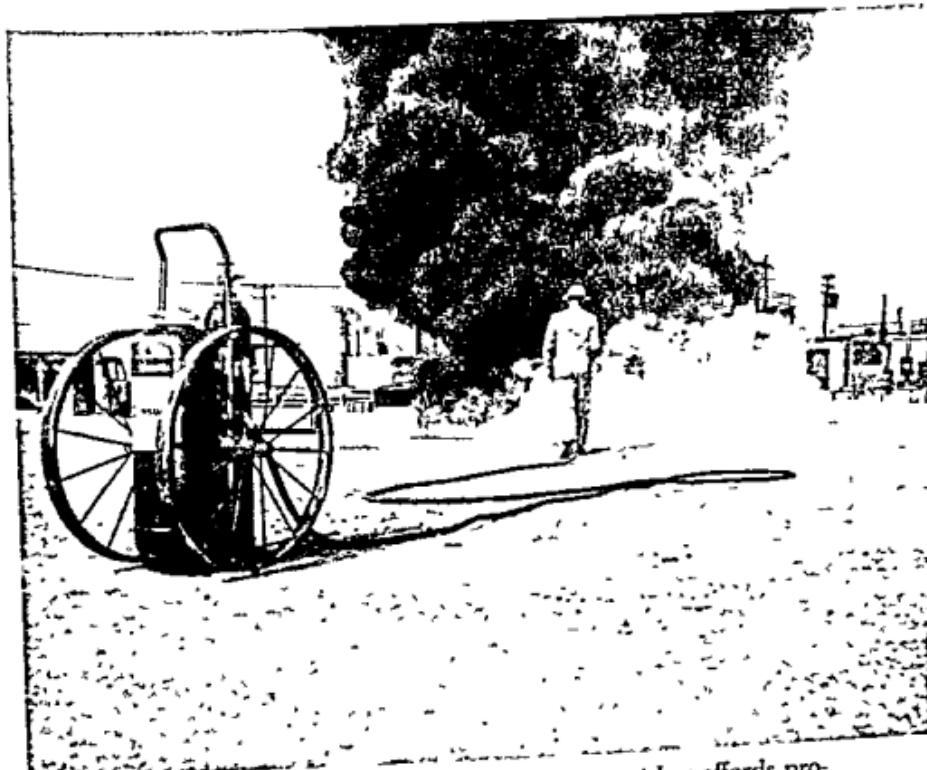


FIGURE 13:3. This dry chemical extinguisher affords protection against large industrial fires.

(Courtesy Ansul Chemical Company)

prevention is related to the total operation. In essence such a program requires that operations, procedures, structures, and equipment be designed and maintained as free as possible from causes of, or aids to, combustion. On the other hand, fire detection requires the development of methods designed to detect and control fires in order to limit the extent of the damage if a fire is started. Chapter 16 describes the various classes of fires and types of extinguishers necessary to control various fire conditions.

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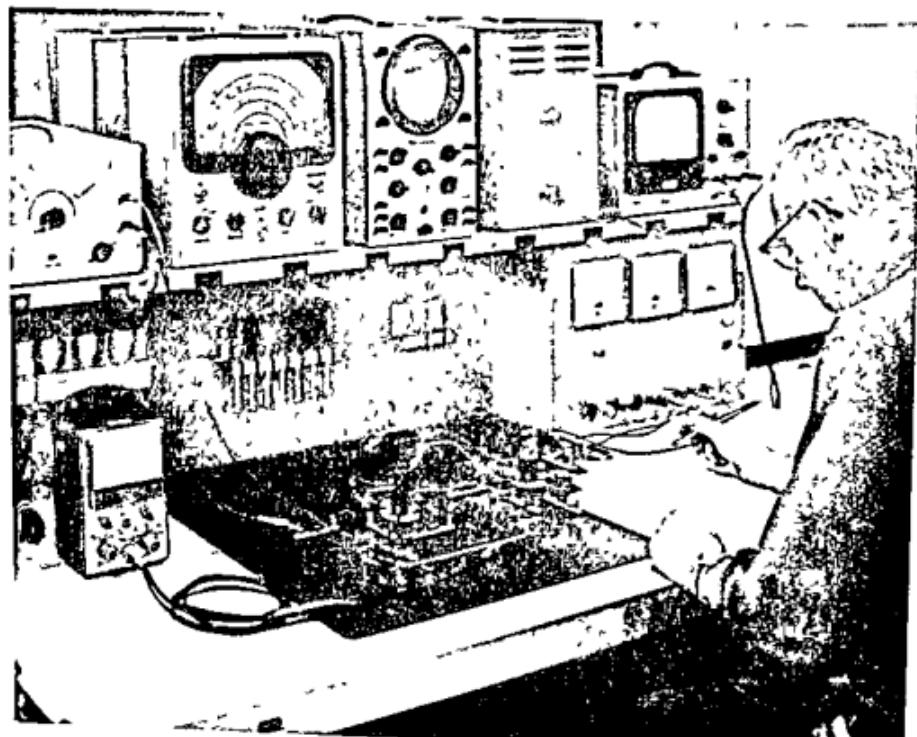


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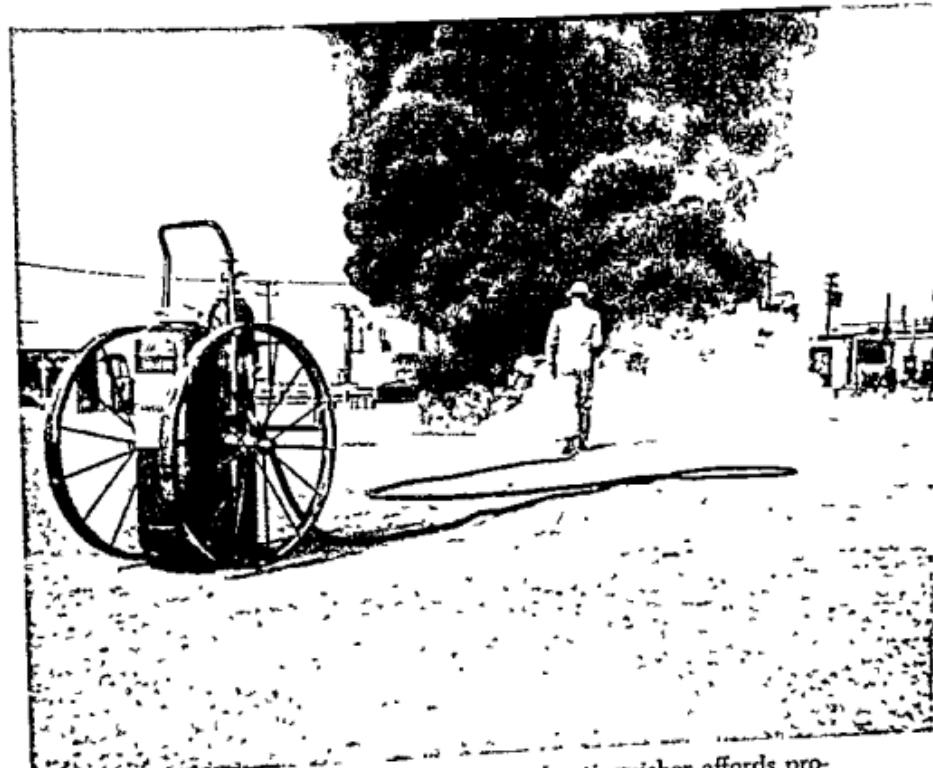


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## PERSONAL PROTECTIVE EQUIPMENT

A fundamental approach to the elimination of industrial accidents is to remove the environmental hazards. If this cannot be done, then the worker must be protected through the use of personal protective equipment. These are some of the various types of protective equipment used in industry: respirators, hard-toe shoes, special gloves, and other protective clothing. They are vital to the safety of the workers. To provide maximum protection, the necessary equipment must be worn at all times.

## ENVIRONMENTAL CONTROL

The environment in which the employee is expected to work daily has a direct influence on his personal welfare. In many industrial operations conditions are produced or materials used that may have harmful effects on the health of the workers. For example, there are conditions that may allow colds to be common or gastro-intestinal disturbances to be prevalent among employees. Problems like these are the most frequent reasons for absenteeism in industries.

The problem today of safeguarding personnel is complicated due to the introduction annually of new hazards, control of which is rather uncertain. Hazards in industry that warrant engineering control may be identified as atmosphere contaminants, noise, variable temperatures, humidity, and radiant energy other than heat.

## OFF-THE-JOB ACCIDENTS

An important problem facing every industry is the matter of keeping the employee accident-free while off the job. The on-the-job accident problem has stabilized, and since the end of World War II has decreased 16 per cent. But the off-the-job record for workers indicates that accidents are a major problem and occur at a spectacular rate. In 1960 there were 29,200 off-the-job accidental deaths as compared with 13,800 on-the-job, a ratio of 2 to 1. Disabling injuries totaled 1.95 million on the job with 2.25 million off the job, a ratio of 1.2 to 1. About two thirds of the off-job deaths were related to motor vehicle accidents, while about one in four occurred in public places and one in five happened in the home. The injury pattern was somewhat different, with two out of five happening in the home and public places, and only one in four occurring from automobile accidents.

There are many reasons for industry's interest in off-job accidents. Apart from the humanitarian reason, industry is concerned with the manufacture of products for a profit. Profits are not as great if employees are involved in off-job accidents that increase medical cost and cause the employer to lose skilled manpower. The employer loses time and money in the training of new workers. The cost of off-job accidents has spiraled to more than 5.5 billion dollars annually. The total cost to industry for such accidents averages about 350 dollars per each off-job injury and costs the employer approximately 10 dollars a year for every employee on the payroll. It is obvious why industry has directed much of time and effort into off-the-job accident prevention programming.

Many industries have in recent years developed off-job accident prevention activities. Programs of this type are varied due to the nature of the accident problem. Employee interest in off-job accident prevention may be stimulated through regularly planned safety meetings, use of films, special posters, checklists, booklets, and exhibits.

### FARM ACCIDENTS

Farm occupations are among the most dangerous open to workers of the nation. When compared with other industries, farm death rates rank third. In a recent year there were 3,300 killed in farm work while approximately 290,000 received disabling injuries. Furthermore, farm accidents cost the economy 1.1 billion dollars per year.

Accidents on the farm occur most often in relation to field work. Livestock chores also rank high as a source of farm accidents. Other areas where farm workers are involved in accidents are related to barn and brush work, machine repair, building repair, and construction work. The lack of supervision over farm workers makes the elimination of farm accidents quite difficult. There is a need for a definite program of accident prevention among rural families. Programs should be sponsored and conducted by the various agricultural organizations that deal directly with the farm worker. These groups include agriculture extension services, Farm Bureau, Grange, 4-H Clubs, Future Farmers of America, and farm women's organizations. All of these groups can contribute substantially to a decrease of farm work accidents through accident prevention programs dealing with the control of environmental hazards and the elimination of unsafe acts.

In view of the fact that the farm resident lacks supervision on the job,

adequate training, and enforcement, the most logical approach to the elimination of worker accidents is through a program of education. The previously named organizations have programs in force that are available in all rural areas across the nation.

## MILITARY

The Armed Forces of the United States represent one of the largest employers of personnel in the nation. The thousands of individuals involved in hundreds of various job tasks also make the military a source of occupational accidents each year. Therefore, the various branches of the armed forces must contend with on- and off-job accidents on the same basis as other businesses and industries. Jackson states that 2,000 of the military die in traffic accidents each year.<sup>3</sup>

In order to curtail the number of accidents involving military personnel, an industrial safety approach is applied. Basically, the Department of Defense is concerned with making the work environment as safe as possible and eliminating unsafe acts. Accident prevention programs in the armed forces are carried on by a nationwide staff of safety program specialists. The central headquarters for this operation is the Department of Defense, Pentagon, Washington, D.C. In addition there are ground safety, management, and engineering safety specialists stationed at the various bases across the country.

Recognizing that the nuclear age calls for intensified accident-prevention programming, the armed forces have accelerated all programs concerned with the saving of human resources. The recent successes in space travel are excellent examples of the application of accident prevention doctrine. For the most part, the military conduct their own training programs. However, contracts with various agencies are entered into for specialized courses of instruction. The Center for Safety Education at New York University has served as a training center for ground safety personnel for many years.

## SAFETY IN INDUSTRIAL EDUCATION

The school industrial education programs allow the student to experience occupational practices in specially designed laboratories for such

<sup>3</sup> Stephen Jackson, "The Military Looks at Traffic Safety," *Annals of the American Academy of Political and Social Science*, Nov. 1958, p. 113.

subjects as electronics, metal and materials technology, drafting, graphics and automotives. These may well be the basis for the student's professional or occupational skills. Public education has for many years recognized the value of safety education and has followed the lead of industry in adopting a positive approach to the problem of accident prevention.

School laboratories of all types have included safety education as a basic part of their instruction for many years and have made an important contribution to the nation's program of occupational safety. Safe practices and safety concepts develop from an understanding of the factors that contribute to accidents and the performance of necessary work tasks in a safety-conscious environment. Without question the industrial education program provides the environment for the development of safe habits and safety concepts that will guide the individual throughout his work life.

Former Secretary of Labor James P. Mitchell stated at the 1958 President's Conference on Occupational Safety that, "despite all our progress, we can today promise only a fifth of our young people an accident-free working life. And this is assuming we can maintain our present levels of accomplishments."<sup>4</sup> The primary concern of the school safety program is to prepare young people so that they may cope successfully with today's hazards at home, in school, and in the community.

#### SAFETY PROGRAMS

Safety efforts in the school can succeed only if the school administrator is concerned with reducing accidents. This is essentially the same situation as in industrial establishments. A substantial and planned program of safety education is the obligation of every modern educational institution. The proper attitude toward accident prevention must be reflected at every level of administration in the school system.

The current theory of safety education programming suggests that all accidents are preventable. Initial application of this theory is related to the identification and removal of hazards. Moreover, unsafe work procedures should be detected and altered. The second step in the reduction of accidents is concerned with the delegation or assignment of authority to one person to see that all safety measures are provided and adhered to. This individual, a supervisor of safety, would be responsible for the development of the three following program areas.

<sup>4</sup> U.S. Department of Labor, *The President's Conference on Occupational Safety, Mar. 25-27, 1958, Proceedings* (Washington, 1958), p. 8.

**INSPECTIONS.** Before adequate control measures can be developed, the extent and nature of existing and potential hazards must be identified. This is accomplished through a comprehensive and continuous program of laboratory facility inspections. It is recommended that the National Standard School Shop Safety Inspection Check List be used as the basis for this inspection. The areas covered are general physical conditions, housekeeping, equipment, electrical installation, gas, personal protection, instruction, accident records and first aid. It is evident that if all of these areas are looked into thoroughly, a complete picture of the relative safety of the instructional facility would be obtained. Obviously this is the starting point in the development of an adequate safety program for the industrial education program.

**INSTRUCTION.** The organization of a planned program of instruction is vital to the elimination of occupational accidents. Through a high-quality industrial education program, understanding, appreciation, and good attitudes related to safe work procedures are developed and sustained. The supervisor of safety education should see that proper safety instruction is offered in each industrial education class. In many instances such instruction would be a logical part of day-to-day teaching. However, it is necessary occasionally to organize separate classes to teach specified accident prevention methods related to certain procedures or operations. The development of a sound program of instruction will produce a safe student for the school laboratory and for the industrial and home situations later on.

**ACCIDENT RECORD SYSTEM.** One of the outstanding weaknesses of current school safety programs is the lack of an accident record system. Each school should have a record system through which every accident is reported by the staff. This is one program that every safety supervisor should pursue and develop at the earliest opportunity.

The organization of an adequate accident report system is discussed in Chapter 6. Such a system allows the safety supervisor to obtain a comprehensive picture of the accident experience of the laboratory areas, and provides a basis for analysis and application of corrective measures. Accident summaries should be analyzed at least twice a year, and a composite report developed on an annual basis.

Safety in industrial education is sometimes taken for granted. However, it is apparent that much needs to be done to keep students safe while they work in the various laboratories. Based on present-day estimates, one out of every 100 students entering the labor force will die, six will suffer

permanent impairment, and 70 will experience one or more disabling injuries as the result of occupational accidents. Getting safety into the consciousness and reflexes of a worker takes a long time. The earlier this foundation is built, the longer it is kept and the greater the chances for success. This is one of the purposes of the school safety program.

## SUMMARY

Occupational accidents of all types have plagued mankind since the beginning of the industrial revolution. The first efforts to protect the employee came in the form of insurance requirements and workman's compensation laws. The annual toll of occupational deaths and injuries has been reduced substantially through the application of basic accident prevention principles. The principles of environmental controls and the elimination of unsafe acts have served as the fundamental approaches to the reduction of occupational accidents.

The success of industrial safety programs has been directly related to the interest taken by top management. In those businesses and industries where interest is high, a substantial and effective accident prevention program has emerged.

School accident problems in industrial education are essentially the same as those of industry. Industrial education departments have taken the lead from industry and are applying the same principles of accident prevention. Since the school laboratories and the industrial environment are essentially the same, the utilization of common principles of accident prevention program elements is a reasonable practice.

## ACTIVITIES

1. Obtain a copy of the National Standard School Shop Safety Inspection Check List and make an inspection of a junior or senior high school industrial education program.
2. If a military base is in the vicinity of your school, contact the safety specialist, interview him, and develop a report on the accident prevention program of the base.
3. Contact the nearest agricultural extension service and determine the scope and nature of its safety education program. Develop a brief analysis of its activities.
4. Outline a program of accident prevention for a single school shop.

(machine, electric, woodwork, or other). Explain why each element included is necessary.

5. Interview five industrial education teachers and determine their philosophy of accident prevention programming for school shops.

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## Public Safety

AN INTERESTING PARADOX can be observed among Americans at work and at play. It seems that the individual is relatively safe while under supervision and performing a job task in either business or industry. But when this same person is free to make choices of safe conduct, he is very likely to become involved in one of many different types of public accidents. Obviously, people apply basic principles of accident prevention to certain means of earning a livelihood, but make no special effort to transfer these same rules of safe living to activities they participate in while off the job.

The average citizen, having fewer on-the-job hours than ever before, has a considerable amount of time to utilize in additional work tasks or leisure time activities. It seems that the latter alternative is the one being selected by most Americans. This choice is being observed by many different groups and agencies across the nation. Accident prevention specialists, in particular, are concerned over the increased participation in various types of outdoor education and recreation activities. This is due to the significant number of individuals killed and injured in these activities each year.

Public accidents, as defined in Chapter 1, include recreation, transportation (except motor vehicle) and public building accidents. Public accidents claim about 16,500 lives per year. Such accidents occur for many reasons.

One of the factors involving people in public accidents is the "lack of supervision" of off-the-job activities. The absence of supervision appears to be directly correlated with accident frequency.

Many people participating in public activities do not prepare for safe participation. They lack the educational training and the physical condi-

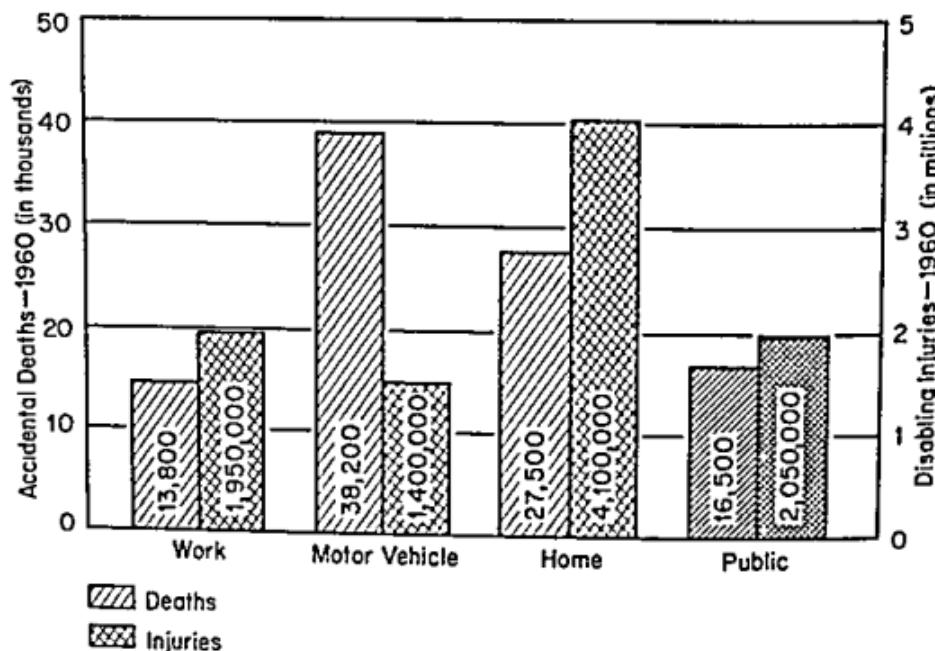


FIGURE 14:1. Comparison of accidental deaths and injuries between public and the other principal classes of accidents.

tioning necessary to participate safely. There are fundamental concepts for each activity that must be learned and practiced if safe conduct is to result. H. J. Stack, in *Education for Safe Living*, states that "a strong plea is made to the student to study the nature of the sport, recreation, or outdoor life activities in which he will participate so that he may enjoy them and secure the benefits they may give without paying a penalty for inexperience or for impetuous action."<sup>1</sup> These and other accident causes will be discussed in detail later in the chapter.

### PRINCIPAL CLASSES OF PUBLIC ACCIDENTS

The potential hazard of public accidents poses a challenge to every person interested in accident prevention. This is particularly disconcerting when it is recognized that there are approximately 100 million swimmers, 40 million boating enthusiasts, 6 million water skiers, 8 million skin and skuba divers, 30 million fishermen, 20 million hunters, and 4 million golfers in the nation. In addition, the 114,000 aircraft aloft add to the complexity

<sup>1</sup> H. J. Stack and J. D. Elkow, *Education for Safe Living*, third ed. (Englewood Cliffs, N. J.: Prentice-Hall, 1957), p. 96.

of the public accident problem. The following is a discussion of the various classes of public accidents with special emphasis on those related to recreational and outdoor living pursuits.

### DROWNINGS

A great amount of time, interest, and money has been spent in the development of swimming programs and "drown-proofing" techniques. These have made valuable contributions to the conservation of human life. Yet approximately 4,400 individuals drown during an average year. These are deaths related to swimming, playing in the water, and falling into the water accidentally. Drownings involving the use of boats are not included in this number. Through the efforts of water safety programs, the rate of accidental deaths associated with drownings has remained constant in recent years. If a significant decrease in the annual toll is to be realized, efforts must be accelerated to teach everyone to swim and to acquaint the general populace with acceptable water safety practices.

Drownings account for about one third of the public, nontransportation accidental deaths and approximately 5 per cent of all accidental deaths. This is an unusually high percentage considering all of the efforts that have been made to eliminate such incidents. The answer to the large numbers of drownings lies in the quality of "water wisdom" possessed by weekend lake or beach enthusiasts. It is reported, for example, that only 12 per cent of all swimmers can be classified as "fair" swimmers and about 1 per cent as "good." The remainder are either weak or poor. Therefore about 87 per cent of all swimmers are considered to be inadequately prepared to cope with circumstances that a water devotee would be expected to handle with relative ease. To point up the lack of water skill on the part of swimmers, a recent Red Cross program summary indicates that only one of six enrolled in water safety classes obtained a certificate of completion that is evidence of ability to swim a minimum of 90 feet.

The principal age groups involved in drowning accidents are the 5- to 14-year-olds, with the 15- to 24-year-olds a very close second. About one third of all drownings occur in each of these age ranges with substantial numbers in the 25 to 44 age group, then less in proportion for the two older classifications. It seems that in all age ranges one fact stands out. It is that seven-eighths of those drowned are boys or men. This is due to the high percentage of male participants, plus the daring careless nature of their actions.

Man is by nature a "land animal." Before acclimating man to a water environment, he must be taught to swim. This instruction must be supplemented with an adequate knowledge of water safety and rescue rules. Any effort to place man in a water setting without his having first mastered this is an invitation to disaster. The growing interest in water activities calls for an increased program of public education to curb a potential multiplication of drownings.

The number of drownings associated with the use of backyard swimming pools appears to be under control at the present time; however, the number of backyard pools projected for the future is cause for concern. Mr. Robert S. Greene of the National Swimming Pool Institute reports that "nine out of ten residential swimming pool owners would definitely consider building a pool in a new home."<sup>2</sup> The number of residential pools in existence today is reported to be in excess of 250,000. If this construction trend continues, problems of accidental death may become a serious threat to the lives of the young and old alike. It is evident that control and supervision are essential for every homeowner fortunate enough to have a pool in the backyard.

## FALLS

Falls are a leading type of public accidental death, surpassed only by motor vehicle accidents. Each year approximately 20,000 persons die from falls and about 3,500 of these occur in public places, representing about one fifth of all deaths due to falls. The number of nonfatal injuries is estimated in the millions.

Falls in public places are especially prevalent among elderly persons due to vestibular deterioration. Recent studies seem to indicate that slowness in recovery when thrown off balance is a characteristic of the older generation and is interpreted as a slowing in central integrative mechanisms rather than a malfunction at a simple sensory level alone.

When comparing the male and female ratio of falls in public places, it is determined that the death rate for males is more than three times higher than for females. Approximately the same ratio is noted for falls on the street or highway and public buildings. Moreover, the male-female ratio is about six to one for sports and recreation areas and close to seven to one for other specific areas. In addition, it is concluded that the problem of deaths due to falls in public places is primarily among young adult

<sup>2</sup> Charles Whitner, *Public Safety Newsletter*, Mar. 1962 (Chicago: National Safety Council), p. 10.

males. When geographic distribution of death rates are considered, the highest rates for public places occur in the Middle Atlantic States, principally New Jersey, New York, and Pennsylvania. The Pacific region and New England rank next, with the lowest rates occurring in the South.

After careful study of the death rate due to falls and the approximate 2.5 million annual injury toll, three basic accident trends emerge. One established pattern is that children, from birth to five years of age, falling on streets and highways account for about one half of all reported public falls. A second trend is that the 5- to 24-year age group receives its greatest number of injuries due to falls in sports and recreational activities, with sizable numbers occurring on the street and highway and a few in public buildings. The third trend suggested is that approximately two thirds of all public falls for those above 25 years of age occur on streets and highways with a considerable number of injuries reported. Most other falls in this age range occur principally in public buildings.

#### WATER

The most rapidly expanding leisure-time activity in the United States is boating. In a recent year, it was estimated that there were 8 million boats in use by approximately 36 million individuals. Furthermore, an excellent index to the popularity of boating is the increase in the number of outboard motors in use. The Outdoor Boating Club of America reports that there are over 6 million outboard motors in the nation today.<sup>3</sup>

The National Office of Vital Statistics defines a *small craft as any watercraft propelled by paddle, oars or small motor, with a passenger capacity of less than 10*. Therefore, the term small boat refers not only to pleasure craft but to boats used for commercial transportation and stevedoring.

The Federal Boating Act of 1958 requires all boats of more than 10 horsepower to be numbered in order to operate on a navigable waterway. Individual states are allowed to pass their own boating laws and may issue numbers and collect revenue if the numbering system is approved by the Coast Guard. The Coast Guard assumes this responsibility in states without a numbering system. Boat users are required by law to report accidents to the state or the Coast Guard. Moreover, there are regulations governing lighting, life preservers, fire extinguishers, and other safety equipment.

Despite the fact that boating and general water activities are attracting

<sup>3</sup> M. Halsey, *Accident Prevention*, (New York: McGraw, 1961), p. 228.

an ever increasing number of participants, they remain statistically among the safest leisure-time pursuits for the American family. For example, during the period of 1949 to 1958 small craft fatalities remained nearly constant. (There were 1,243 such deaths in 1949 and 1,298 in 1958.)

The following is a brief discussion of fishing and water skiing, the two most popular sports related to boating and water activities.

**FISHING.** An interesting aspect of the water safety problem is that approximately 40 per cent of all outboard motors are bought principally for use in fishing. This fact is understood, however, when it is known that there are over 30 million fishing enthusiasts in the nation. From a financial point of view, fishermen gave the nation's economics a boost by spending nearly 2.7 billion dollars in 1960.

To the innocent bystander an activity such as fishing appears to be accident-free. But the fact is that in a recent year fishing was the activity associated with approximately 54 per cent of all fatal boating accidents. This data calls attention to the fact that fishing accounts for a larger proportion of recorded accidents than is usually suspected.

**WATER SKIING.** Americans are constantly searching for a sport that will challenge and excite human nature. Such exhilaration is being experienced in the relatively new activity, water skiing. The number of water skiers has multiplied so rapidly that it has been difficult to keep abreast of the growth. However, it is estimated that there are in excess of 6 million persons water skiing today. As with fishing a great number of boats are purchased each year to be utilized in this sport alone. A current report states that water skiing accounted for some 20 per cent of all boat sales.

Outwardly, water skiing appears to be a rather dangerous sport. The facts, however, do not bear this out. Only about 4.5 per cent of all fatal boating accidents in 1958 happened while the victims were engaged in water skiing. In this attractive sport it is probable that the typical skier does not venture out during adverse weather as do many fishermen, nor do the drivers of such boats have inclinations to stand or overload the vehicle. For these reasons alone, water skiing would be considered a relatively safe activity.

#### FIREARMS

During the past five years the number of persons engaged in hunting increased by 24 per cent. This represented the largest percentage gain of any leisure-time activity. Though attracting fewer people than fishing



FIGURE 14.2. Guns should be assembled and loaded in the field.

(Courtesy National Safety Council)

does, over 18 million persons are participating in hunting and shooting activities of various types. Persons of all ages and of both sexes are enjoying hunting, supervised rifle and pistol target shooting, and shooting in the

field. Of particular interest is the fact that the number of women hunters has more than doubled in the past five years.

People using firearms are attracted to them for a variety of reasons. There are those who feel a sense of importance or power. Others enjoy fine workmanship, while many find great satisfaction in using the gun efficiently while hunting or target shooting. Guns, like most pieces of equipment used for recreation, are not dangerous if used properly. Yet there are around 1,050 deaths from firearms accidents each year. These are mishaps associated with the use of guns while hunting or field shooting. This does not include the nearly equal number of individuals killed in firearms accidents in the homes, as discussed in Chapter 12.

A recent trend associated with the use of guns is the rapid organization of shooting clubs. The National Rifle Association reports that affiliate organizations now number 12,000 to 15,000 and claim membership above 500,000. Most of these groups own and maintain shooting ranges. There are said to be more rifle and pistol ranges operating in the nation than there are public golf courses. Also closely associated with this trend is the increase in the number of tournaments and educational programs being organized and conducted. Hunter safety courses are becoming prevalent, and in some states legislation has been passed to require hunters to attend and pass a course in safe firearm practices prior to licensing. Educational programs are the best approach to hunter safety as evidenced from the experience of many states. For illustration, in the state of Montana there were no fatal firearms accidents during the year among persons who had been certified through training classes.<sup>4</sup>

## FLYING

Today the number of aircraft for commercial, private, or business use is spiraling upward. One fact unknown to many individuals is that most of the aircraft aloft are in the general aviation category. General aviation aircraft are the planes used for personal or business reasons. Of the 114,000 aircraft in use, about 2,000 are commercial airliners, 42,000 military planes, and over 70,000 are private and business aircraft. Thus nearly 65 per cent of all planes registered are used by general aviation pilots.

Despite the fears of thousands who do not fly, the modern airplane is an extremely safe, efficient, and useful vehicle. A testimony to the fact

<sup>4</sup> J. MacDuffie and F. H. Dunkle, *Hunter Safety Newsletter* (Helena, Mont.: Fish and Game Department, Feb. 1961).

that flying is extremely safe is the annual accident statistics reported by the National Safety Council. Approximately 1,000 deaths a year are the result of aircraft accidents. Considering the 2.75 billions of miles of flying time logged annually, this represents a 0.5 death rate for all flying activity. When compared with the traffic fatality rate of 5.3, it can be concluded that flying is a relatively safe venture.

There are a variety of uses for the modern aircraft. The Federal Aviation Agency classifies plane usage into the categories of (1) instructional, (2) noncommercial, (3) commercial, and (4) public. From this classification it is determined that aircraft used for pleasure (noncommercial) are the ones most frequently involved in fatal accidents. For example, in a recent year 4,200 accidents occurred in noncommercial usage. Resulting from these accidents were 193 deaths. This is by far the greatest number for all types of plane activity.

The typical aircraft in use is capable of carrying four persons in comfort comparable to the motor car. It travels at speeds between 120 and 200 mph and for distances ranging from 500 to 1,000 miles. Travel cost for fuel and oil is similar to that of an automobile trip of equal distance. In addition to the increased use of such vehicles for business and pleasure, it is also noted that there has been a substantial increase in plane usage on the part of special groups, namely the Flying Farmers Association and the Flying Physicians Association. There are currently 7,000 members of the FFA scattered through 40 states and four provinces of Canada. Because of its versatility as a farm implement (fertilizing, spraying, and planting) and as a means of transportation and pleasure, the plane is the most popular and familiar piece of farm equipment to members of these families. About 50 per cent of the Flying Farmers have private landing strips and own an average of nearly one-and-one-half airplanes per member. The Flying Physicians Association is also attracting physician pilots at an amazing rate. The utility of flying attracts many physicians, but the role that a doctor can play in promoting safety among aviation converts is equally appealing as a challenge for community service. The basic concern of the FFA and FPA is that flying activity be carried on in a safe and intelligent manner.

#### RAILROAD

The double "R" sign that warns motorists of a railroad crossing is one of the most familiar on the nation's highways. It is not the only important

sign along the road but frequently for an individual driver it can be the most important sign in his life. The constantly decreasing train-vehicle crash deaths throughout the past few years represent a significant breakthrough in public safety. This advance is demonstrated by the fact that in 1950 there were 1,450 deaths while only 10 years later the number was reduced to approximately 650. This latter figure represents less than 1 per cent of the total public accidental deaths.

In general train-motor vehicle accidents occur in one of the following ways: (1) locomotive hits car, (2) car hits locomotive, (3) car hits another part of the train. A very interesting fact is that in the vast majority of railroad-vehicle accidents, both day and night, it is the locomotive that hits the car. Evidently these occur when persons attempt to beat a locomotive to the crossing only to discover that time has run out and the train is occupying the same space. It is apparent to everyone that trains are massive vehicles that run on tracks while automobiles are comparatively small and have some freedom of direction; it is further obvious that an automobile weighing around two tons has little chance of competing and winning the space to be occupied by a locomotive weighing 150 tons plus 4,250 additional tons if coupled to 50 loaded cars. An awareness of such odds should make all drivers think twice before violating common-sense precautions at grade crossings.

## CAMPING

Since around 1930 the camping movement has continued to gain popularity with all age groups. Initially, camping began as an organized activity attracting principally boys and girls. Today, however, this type of adventure is attracting adults and children alike. Basically, it can be stated that there are two forms of camping activity: organized camps for youth and camps for families.

It is estimated that there are now 10,000 organized camps in the United States. About 66 per cent of these are operated by youth-serving organizations such as churches and service groups. Privately owned camps constitute 32 per cent of all camps and the remaining 2 per cent are operated by school boards, municipalities, conservation groups, and other tax-supported agencies. Some 97 per cent of the campers are elementary and secondary school youth. It is estimated that the annual camp population is more than 5 million. Of special interest is the increase in the number of

camps designed to accommodate handicapped children. One of the better camp programs of this type in the country is conducted by the Recreation and Outdoor Education Department of Southern Illinois University in Carbondale, Illinois.

Camping as a family leisure-time activity has captivated the interest of the typical American family. It is estimated that there are between 8 and 10 million camping families. This represents a significant percentage of the 16 million individuals involved in camping activity. A camping trip by auto is an inexpensive and delightful way for the family to vacation and have fun. With the current highway system and the type of portable camp equipment available, it is practical for the family to camp on weekends or for indefinite periods of time, moving from one location to another or setting up in a permanent camp location. This type of activity has become so popular that the American Camping Association has recently established a Family Camping Federation to co-ordinate the efforts of family camping clubs, association camp owners, government officials, and others concerned with family camping.

Accidents are unfortunately an accompanying element of the expanding interest in camping. In order to make camps as safe as possible, the American Camping Association has established standards for the conduct of camp programs. Many states have established standards and fundamental safety regulations for state parks where much of the family camp activity occurs. Data are not readily available to ascertain the extent of the accident problem in the area of camping. However, it is fair to assume that hundreds are involved in accidents associated with this activity. Therefore, all campers should be concerned with the safe conduct of camping enterprises so that these activities will be experiences of greater adventure.

#### CAUSES OF PUBLIC ACCIDENTS

People are involved in various public accidents in the city, at work, or on the highways. The similarity among the causes of public accidents is evident when it is understood that the principles of accident causation discussed in Chapter 1 are operative in all areas and activities where accident potential is present. These two principles are related to unsafe behavior and unsafe environment. The following is a discussion of the major elements involved in the application of these principles with ramifications

that apply to the public safety problem, especially recreational programs and activities.

#### ATTITUDE

The human element is the most significant factor related to accident causation in public accidents. The hunter, fisherman, swimmer, and boat user are all principally responsible for the accidents that occur in their related activities. For example Figure 14:3 indicates very clearly that the operator is at fault in 74.3 per cent of all boating fatalities. Comparable

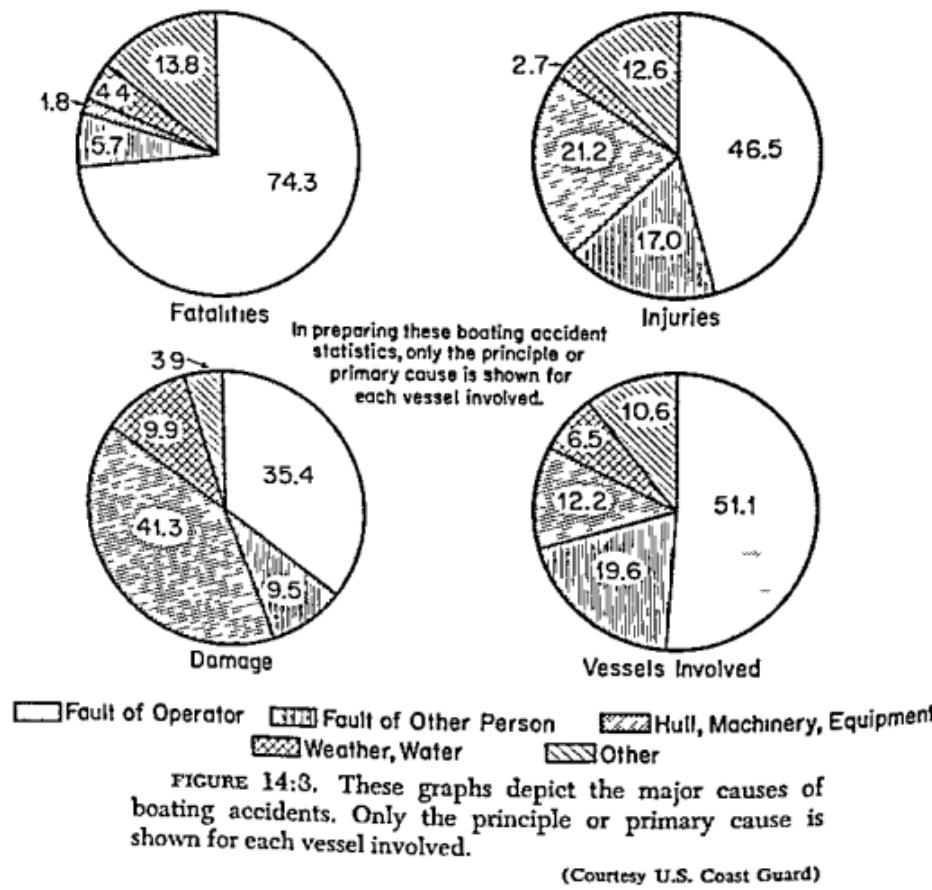


FIGURE 14:3. These graphs depict the major causes of boating accidents. Only the principle or primary cause is shown for each vessel involved.

(Courtesy U.S. Coast Guard)

statistics are available that suggest the same cause to be the major problem in all other recreation activities. Careless, irresponsible, thoughtless, and unsportsmanlike behavior on the part of a person is indicative of a

poor attitude toward the safety of self and others. When such conduct is displayed by the individual, it is impossible for the human mechanism to think, act, and interpret on a rational basis. The result is generally the establishment of a sequence of actions that invariably end in a death, injury, or property damage accident. Faulty attitudes are a basic step in the vast majority of all accidents.

#### ENVIRONMENT

Environment plays a particularly important part in keeping the people of the nation free of accident problems. Most often, however, this is not recognized by the general populace. In the area of public safety, environment is related to equipment, machinery, and conditions.



FIGURE 14:4. Proper equipment is important to safe boating.

(Courtesy National Safety Council)

For every activity that uses equipment, there is a correct size, weight, and strength for the equipment. In hunting, for example, there is an

appropriate firearm for each person. Taking care of the equipment is as important as making the proper selection. Each time equipment is used it must be in good condition. Through a conscientious program of maintenance, equipment standards can remain high.

Proper protective clothing is necessary also, if a safe recreational adventure is to result. In archery, for example, arm guards are to be used at all times. While hunting, heavy trousers must be worn to protect the hunter from snake bites, thorns, and insects. Also the hunter should wear a bright colored hat or jacket, depending on the game being hunted.

A substantial knowledge of the physical limitations of equipment is vital to safe participation. Most pieces of recreational equipment have been tested to operate up to a specified level of performance. Beyond this performance threshold it is unsafe to expect additional action.

Conditions relate to prevailing circumstances present when participating in an activity. Weather conditions while boating or swimming are another environmental factor in accident causation. Individual competency would be an element related to accidents in the use of boats and firearms.

The relationship between environment and accidents has been an established principle of accident prevention for many years. Therefore, it is necessary to apply this principle in the public safety area if people are to enjoy themselves and gain full benefit from the many leisure-time pursuits of today.

#### SUPERVISION

There is a close correlation between accidents and the amount of supervision applied. As pointed out previously when individuals are free to make choices regarding safe conduct, many poor decisions are made. *Supervision can be thought of either as overseeing by one or more persons or as rules and regulations that direct, control, or restrict human activity.*

Close supervision of employees is one of the principal reasons for industry's success in the development of an on-the-job safety program. In recreational pursuits the absence of supervision accounts for a large percentage of the accidental deaths and injuries. There is a definite lack of supervision in the latter. This means that there must be self-enforcement of safe practices. Education must take place within the individual before such an objective can be realized. In view of the need for a program of education for safe living, the school is brought into focus. Since the school

is the agency that deals with the educational process, it is justified in the offering of an educational program designed to teach persons the fundamentals of safety education. The National Rifle Association, Coast Guard, Red Cross, and other agencies can provide educational programs to fill the needs of adults.

In many instances, it seems necessary for one or more persons to be responsible for the conduct of the individual or family. This may be either direct personal supervision or it may be instructions or rules to be in force while the individual is taking care of himself. Lifeguards at pools and beaches provide supervision of water sports and game wardens apply some supervision in field hunting; both of these are examples of direct personal supervision. The second supervision possibility mentioned is concerned with the establishment of policies that must be practiced by each person or group in order not to have their privileges rescinded. There are, for example, rules that govern the use of inland lakes and waterways. Specifically, if a person decides to operate a boat on a federally owned lake, he must obtain a license for the boat to be used. This provision was established as a result of the Federal Boating Act of 1958. There are countless other examples where the individual is required to abide by certain regulations that control and restrict actions. It is evident that education is the means through which individuals learn to accept and apply these safe practices.

Each of these areas of supervision is essential if people are to participate in various recreational sports and keep the number of deaths and injuries to a minimum. Without control and supervision, the rivers, lakes, fields, and highways would be in a constant state of chaos.

#### **KNOWLEDGE**

A certain amount of knowledge is a prerequisite before any human activity can be intelligently pursued. If knowledge or information is lacking, there is a real possibility that the individual will perform haphazardly. Such action most often results in an accident or near-accident. Knowledge of safe practices is essential to acquaint the person with the hazards of the projected activity. Furthermore, a basic understanding of the physical limitations and the proper use of the equipment must be learned by the individual prior to attempting such projects. In addition, the individual should learn the rules and regulations of the sport in order to perform safely. Indeed, knowledge is always considered necessary in the prevention

of accidents and, therefore, is vital to safe participation in the various activities described in this chapter.

### SAFE PRACTICES

It has been stated many times that most accidents associated with leisure-time activities can be avoided. Elimination of such mishaps is based on learning and applying of fundamental safety practices for each activity. In Figures 14:5 and 14:6, there is an enumeration of principles and safe practices in recreational activities that should be operative in each area of participation.

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#### CONFERENCE FOR NATIONAL COOPERATION IN AQUATICS BELIEVES

- THAT . . . Aquatics is one of the best recreational activities for the entire family.
- THAT . . . Under competent leadership, swimming and aquatics can contribute to physical, mental and social fitness.
- THAT . . . Everyone should have the opportunity to improve his knowledge of Water Safety and should be encouraged to take advantage of this opportunity.
- THAT . . . Cooperative community aquatic programs help reduce water accidents.
- THAT . . . The primary objective of Water Safety Instruction is to make the individual safe while in, on, or about the water.
- THAT . . . Every community has a responsibility to develop adequate aquatic facilities.
- THAT . . . Existing aquatic facilities should be utilized to the fullest.
- THAT . . . Education in aquatics should be included in the program of every school system.
- THAT . . . Swimming is a healthful activity in which almost everyone can participate, including those with physical limitations.
- THAT . . . All interested groups and individuals should work together to promote aquatics.

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FIGURE 14:5. Beliefs Established by the Conference for National Cooperation in Aquatics.

### EDUCATIONAL PROGRAMS

Public safety problems, especially in recreational activities, are a great challenge to accident prevention specialists. In general, the answer to resolving most of these accident problems lies in the development of comprehensive programs of education for safe living. The wisdom of general public education is universally recognized and accepted.

## SAFE PRACTICES IN RECREATIONAL ACTIVITIES

### BOATING

1. Check condition of boat before leaving shore.
2. Have approved life preserver aboard for all passengers.
3. Equip boat with fire extinguisher.
4. Reduce speed near beaches or in passing other craft.
5. Carry adequate fuel supply; never refuel with motor running.
6. Learn to handle boat by practice near shore.
7. Never overload with passengers.
8. Load craft on the bottom and in the middle.
9. Enter or move about in boat, one at a time.
10. Avoid "horseplay" at all times.
11. Plan all trips.

### SWIMMING

1. Obtain medical exam before learning to swim.
2. Swim with another person at all times.
3. Know and observe your swimming limitations.
4. Know your water before diving.
5. Never jump or dive into cold water or swim very long.
6. Never swim in the dark.
7. Know your capacity for rescuing another swimmer.
8. Use ear and eye protection if needed.
9. Choose swimming area carefully.
10. Include a person trained in life saving techniques on your picnics and outings.
11. Swim at supervised beaches and pools.
12. Organize a swimmer check system when with a group.

### GENERAL CAMPING

1. Avoid poisonous plants, reptiles, and insects.

2. Camp away from tall, isolated trees.
3. Travel with a companion in rough mountainous country.
4. Avoid rock climbing.
5. Drink only approved water.
6. Eat only those berries or mushrooms known to be edible.

### PLANNING FOR CAMPING

1. Plan each outing.
2. Select proper and adequate supplies and equipment.
3. Study modern campcraft methods.

### HIGHWAYS

1. Set good examples as motorists.
2. Be aware of changes from routine driving habits—extra loads, racks, trailers.
3. Wear seat belts.

### HUNTING

1. Carry an *empty* gun into camp, home or auto.
2. Point a gun in a safe direction.
3. Never indulge in "horseplay."
4. Unload gun before leaving it.
5. Lay gun flat when resting in field or woods.
6. Pass gun through fence to a companion.
7. Make certain the barrel is free of obstruction.
8. Point muzzle down when walking single file.
9. Never pull a gun towards self from a boat or through a fence.
10. See that safety catch is ON.
11. Make certain of target before firing.
12. Wear light colored clothing.
13. Be alert to avoid confusion with others.

**SAFE PRACTICES IN RECREATIONAL ACTIVITIES (cont.)****WATER SKIING**

1. Wear a life jacket and be a good swimmer.
2. Check equipment.
3. Be courteous to other water users.
4. Watch water ahead.
5. Ski parallel to shore.
6. Avoid falling forward.
7. Learn new starts progressively.
8. Have extra person in boat to watch skier.
9. Hold ski up after fall.
10. Stop motor while assisting skier into boat.
11. Recover skis quickly—they will keep you afloat.
12. Never ski at night or in shallow water.

**SCUBA DIVING**

1. Dive only in parties of two or more.
2. Use diver's flag.
3. Use only breathing apparatus of commercial manufacture.
4. Dive only between sunrise and sunset and in legal waters.
5. Dive only in waters free of solid ice surface.
6. Dive for reasons other than depth or endurance records.
7. Dive only while free of the influence of liquor or narcotics.
8. Dive no deeper than 60 feet unless equipped with self-contained underwater apparatus and no deeper than 130 feet if so equipped and with weight belts worn outside all harnesses.

**FIRE PRECAUTIONS IN CAMPING**

1. Build fires downwind from camp area.
2. Break all matches after use.

3. Drench fires with water if possible.
4. Collapse the tent and pour on water, if a tent catches on fire.
5. Use blankets or sand to smother unwanted fires.
6. Store flammable items away from unattended fire.
7. Report at once any evidence of a forest fire.
8. Teach children respect for fire.

**CAMP FIRES**

1. Clear area at least four feet in diameter.
2. Remove debris and build a rim with rocks.
3. Build fires on rock, sand, gravel, or mineral soil.
4. Keep an open fire small.

**SAFE PRACTICES IN GENERAL AVIATION**

1. Preflight walk-around before starting engine.
2. Double-check air and ground space for potential hazards.
3. Use checklist prior to starting engine.
4. Retreat when ceiling goes to 800 ft. and visibility is 3 miles.
5. Study preflight weather.
6. Have a 2,000 ft. ceiling at night.
7. Keep airspeed 120% of stall speed on take-offs and 140% on landings.
8. Operate 500 ft. above highest obstruction.
9. Take off and land at designated airports.
10. Abort take-off if not airborne in first half of runway.
11. Retain control in landing until wheels cease to roll.
12. Stay 1000 ft. from jet blast end.

FIGURE 14:6. Safe Practices in Recreational Activities  
(cont.)

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SAFE PRACTICES IN RECREATIONAL ACTIVITIES (cont.)

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- 13. Never attempt to operate an aircraft unless "checked out" in that model.
- 14. Never operate "on top" except widely scattered clouds.
- 15. Never land on wet grass.
- 16. Never take plane aloft if wind velocity exceeds 40% of stall speed.
- 17. Never take off if under 90° cross surface winds exceed 20% of stall speed.
- 18. Never operate at night unless qualified under C.A.R.
- 19. Never operate after drinking.
- 20. Never hand-start plane unless qualified person is at controls.

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FIGURE 14:6. Safe Practices in Recreational Activities  
(cont.)

The schools may play a significant role in the development of these educational pursuits. Through the various subjects already existing in the school's curriculum, units on water safety, hunting, camping, and many others can be taught. Existing courses such as social studies, biology, physical education, home economics, and health education lend themselves naturally to the safety instruction mentioned in this chapter. Many times separate courses in swimming, gun safety, and outdoor education are available. In some states, legislation requires the schools to develop and offer courses in rifle shooting. This seems to be the beginning of requiring schools to teach various courses related to the area of public safety.

In addition to the school, various organizations conduct programs and courses in the interest of public safety. For example, the U.S. Power Squadrons offer eight courses in boating safety. These courses are Seamanship, Elementary Piloting, Advanced Piloting, Weather, Junior Navigation, Navigation, Maintenance, and Sail and Instructional Techniques. The U.S. Coast Guard also offers two courses through the Coast Guard Auxiliary. Other organizations offering similar courses are the Outboard Boating Club of America, the National Safe Boating Association and American National Red Cross. Each of these groups offers excellent programs of public education that are available to schools and all interested organizations.

The National Rifle Association of America represents the most outstanding organization conducting programs in the area of firearms safety. Currently the NRA hunters' safety course is the one being adopted by states requiring training prior to licensing. The Sporting Arms and Ammunition Manufacturers Institute and the National Education Association are others lending valuable aid in the development of firearms

training courses. In addition, the American Camping Association and its affiliate, the Family Camping Committee, are giving assistance in the organization of camp safety efforts.

Today across the nation, many thousands learn to enjoy and participate safely in recreational activities through private lessons. The skills derived from private lessons in golf, skiing, shooting, and other activities are of great value. Having learned these skills, individuals enjoy their leisure-time enterprises in a greater degree of safety. Due to the increased interest in personal instruction, numerous private training clubs and groups have emerged.

It is obvious that there are numerous educational programs available to schools and community organizations. However, with the projected trends of increased participation, additional educational programs and courses will be needed. In addition the quality of existing programs must be upgraded to stay ahead of the rising accident toll.

## SUMMARY

In recent years the American public has experienced a trend toward the shorter workweek and, therefore, an increase in the amount of time available for recreational activities. The general public is using this leisure time by taking to the water, air, woods, fields, and streams. Along with the increase of sports enthusiasts, there has been a comparable explosion of public accidents.

People engaged in recreational activities have accidents due to unsafe behavior, lack of supervision, misuse of environment, and lack of knowledge of rules, regulations, and safe practices. To stem the tide of such disasters, public and private organizations are engrossed in the development of educational programs relevant to safe living. All programs being offered by schools and other agencies will, of necessity, have to be accelerated to keep abreast of the increasing number of participants. If the prophesied four-day work-week becomes a reality, people will have one more day of leisure time than currently exists. A major portion of this release time will be spent on recreational adventures. It is desirable that these experiences be safe. The fundamental objective of public safety is to assure this end.

## ACTIVITIES

1. Using Figure 14:6 as the basis, develop a detailed teaching unit on water safety.

2. Contact your state conservation and wildlife department with the request for statewide accident data in the areas of hunting and camping. Present the results to the class.
3. Contact the local Red Cross chapter and arrange for a small-craft demonstration to be presented to the class. This, of course, should be done in co-operation with the class instructor.
4. If there is a shooting club in the area, arrange to visit the firing range.
5. Make an analysis of the curriculum of the secondary school in your county, and determine how much instruction related to safety in recreational activities is included.
6. Preview a film on public safety and develop a short report on the major principles discussed.

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## Safety in Traffic and Transportation

MOTOR VEHICLE TRANSPORTATION has been a blessing to the advance of American culture, but at the same time it has become both an economic affliction and a humanitarian challenge to the American people. The dimensions of the traffic safety problem are complex and stagger the imagination. For example, a 10-year average of traffic accident statistics indicates that 37,500 are killed, 1.4 million injured, and 6 billion dollars lost as a result of traffic accidents each year. An estimated 100,000 households are affected to a major degree annually by traffic accidents, and the nation's economy suffers a loss of some 500,000 man-years of productive time.<sup>1</sup>

Traffic accidents rank sixth among the causes of death in the United States. For the 5 to 14 age group, however, they are the leading cause of death by only a narrow margin. For the 15 to 24 age group, traffic accidents lead the causes by a wide margin, being responsible for four-and-one-half times as many deaths as the next leading cause.

The number of persons of various age groups killed and injured in traffic accidents is not in direct proportion to their number in the population. The death rate in a recent year, for example, ranged from a low of 8.3 per 100,000 for the 5 to 14 age group to a high of 42.7 for the 15 to 24 age group. Injury rates by age groups also show wide variations. Based on population, the highest injury rate in a recent year occurred in the 15 to 24 age group. Those 65 and over had an injury rate about equal to the under 5, and the 5 to 14 age groups; however, the death rate among this

<sup>1</sup> David Baldwin, "Dimensions of the Traffic Safety Problem," *The Annals of the American Academy of Political and Social Science*, Nov. 1958, p. 9-12.

older age group is probably due to their lessened ability to recover from injuries.

Since the advent of the motor car the American family has become more and more dependent on its use. Of the approximately 53.4 million families in the country, 41 million own automobiles and more than 7.5 million families own two or more vehicles. About 80 per cent of the men are licensed to drive and about 40 per cent of the women.<sup>2</sup>

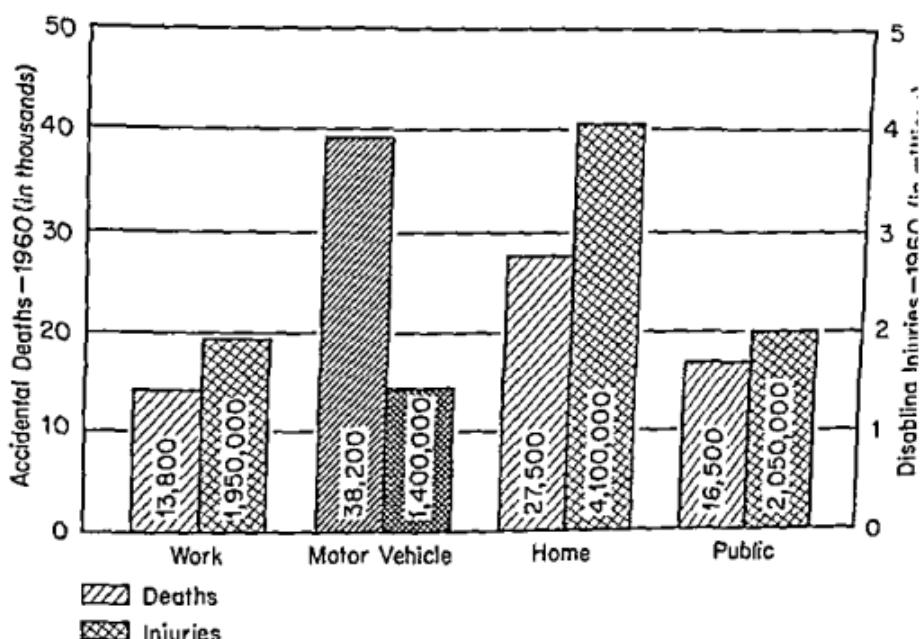


FIGURE 15:1. Comparison of accidental deaths and disabling injuries between Motor Vehicle and other principal classes of accidents.

The automobile is used in almost every phase of family life. A day in the life of an average American family's car may begin by driving the father of the house to his job; a child to band practice; the mother to her dentist appointment, the drive-in bank, and the grocery store; the father home for lunch; another child to a birthday party and later to church choir practice; the father home from work, stopping at the post office; a child to a ball game, and the father to a meeting. The average family car is constantly on the go and is driven at least 10,000 miles a year.

<sup>2</sup> National Highway Users Conference, *The Highway Transportation Story in Facts* (Washington: The Conference, 1961), pp. 7-8.

## THE TRAFFIC ACCIDENT PROBLEM

Apart from the automobile's many useful pursuits, a by-product of vehicle use which appalls the citizenry of the United States is the annual traffic accident toll. The motor car has been in use since the turn of the century. Yet, during this period of time over 1.4 million persons have lost their lives in traffic mishaps. Tens of millions more have been injured, many of them permanently. Since 1900 more than twice as many Americans have been killed in traffic accidents as were killed in all wars involving the nation since the American Revolution.

It is amazing to note that in a single year more than 17.5 million drivers are involved in 10 million motor vehicle accidents. If we include injuries that restrict normal activity and/or require medical attention, the annual injury total is 4.7 million, or about one out of every 37 persons of the population. These statistics point out the startling fact that a person is killed every 15 minutes and someone is injured every 24 seconds on the streets and highways.

On a mileage basis, traffic accident rates are highest among younger drivers. Among the 15 to 24 year olds, traffic accidents account for about 40 per cent of the deaths from all causes. Military personnel also have unusually high accident rates. Figure 15:2 gives a complete analysis of traffic accidents as related to the age of drivers.

Age Group	All Drivers		Drivers in Accidents				Accident Index	
			Fatal		All			
	Number	%	Number	%	Number	%	Fatal	All
Total	90,500,000	100.0	46,000	100.0	18,500,000	100.0	1.00	1.00
Under 20	6,500,000	7.2	6,000	13.0	2,700,000	14.6	1.81	2.03
20-24	10,100,000	11.2	7,700	16.7	2,800,000	15.1	1.49	1.35
25-29	11,500,000	12.7	5,600	12.2	2,260,000	12.2	.96	1.00
30-34	11,300,000	12.5	4,800	10.4	1,810,000	9.8	.83	.78
35-39	10,500,000	11.6	4,200	9.1	1,900,000	10.3	.78	.89
40-44	9,300,000	10.3	4,200	9.1	1,700,000	9.2	.88	.89
45-49	8,200,000	9.1	3,500	7.6	1,450,000	7.8	.84	.86
50-54	7,100,000	7.8	2,700	5.9	1,150,000	6.2	.76	.79
55-59	5,600,000	6.2	2,100	4.6	960,000	5.2	.74	.84
60-64	4,300,000	4.7	1,800	3.9	690,000	3.7	.83	.79
65-69	2,800,000	3.1	1,400	3.0	620,000	3.4	.97	1.10
70-74	1,900,000	2.1	1,000	2.2	230,000	1.2	1.05	.57
75 and over	1,400,000	1.5	1,000	2.2	230,000	1.2	1.47	.80

FIGURE 15:2. Age of Drivers — Total Number in Accidents, 1961.

(Courtesy National Safety Council)

## WHERE PEOPLE ARE KILLED

People are killed in a variety of traffic highway circumstances. There is no set pattern of accident occurrence; however, it is possible to identify those types of accidents in which the greatest number of traffic victims tend to cluster each year. The statistical information used in this section is based on *Accident Facts*, the annual publication of the National Safety Council.<sup>3</sup>

The largest number of traffic deaths occur in accident situations involving two or more vehicles. There were 14,800 multiple-vehicle highway deaths in 1960 involving passenger cars, motorized bicycles and scooters, and road machinery. The fact that 12,150 of these deaths happened in a rural setting indicates that higher impact speeds on these highways account for the large percentage of fatal accidents. The second major classification of traffic deaths is related to vehicles overturning or running off the roadway. These types of accidents accounted for 12,100 deaths. A third major area, pedestrian accidents, resulted in 7,750 deaths.

Another major type of traffic death is that involving collisions with fixed objects. In a typical year, accidents which occurred from hitting trees, walls, and abutments accounted for 1,700 fatalities. Two additional classifications of traffic fatalities are those involving collisions with (1) trains, and (2) bicycles. Some 1,310 vehicle-train deaths occurred in a recent year, while in the same year there were 460 bicycle deaths. The last category of traffic deaths is related to those accidents involving street cars, animals, and animal-drawn vehicles. There were 85 traffic victims in this category.

## WHY TRAFFIC ACCIDENTS

Traffic accidents occur for a number of reasons. However, it is difficult to account for the exact circumstance of every motor vehicle accident. Through various studies and constant analysis of the traffic accident situation, it is possible to identify the major causes of motor vehicle accidents. For example, research has shown that about 64 per cent of the drivers involved in fatal accidents have violated a traffic law at the time of the accident. Studies have indicated also that rural pedestrians account for one of every nine fatal accidents.

<sup>3</sup> National Safety Council, *Accident Facts* (Chicago: The Council, 1961), pp. 42-43.

## ALCOHOL

A major cause of traffic accidents is the use of alcohol by drivers. Studies have shown that a blood alcohol concentration of 0.05 per cent impairs to some degree the driving ability of most persons. Even one drink has been shown to affect a person's responsiveness behind the wheel. Upon reaching a concentration of 0.15 per cent and above, every drinking driver is considered "under the influence" of alcohol. Most states have laws that legally fix the "under influence" at 0.15 per cent and above. Recently the American Medical Association and other national organizations have recommended that the per cent of concentration be lowered to 0.10 as the legal basis.

In a recent year, a study in 21 states showed that 21 out of 100 drivers in fatal accidents had been drinking. Drinking adult pedestrians accounted for 25 out of 100 pedestrian deaths in a recent study in 18 states. In all probability the problem of drinking drivers is more acute than the facts indicate. This is due to the lack of prosecution in a court of record. It is proposed that many cases are booked on some other offense because of the inability to make a DWI (Driving While Intoxicated) charge valid in court. Traffic courts have tended to dismiss DWI offenses due to the threat of criticism or reprisals by those so arrested.

## SPEED

The National Safety Council reports that speed too fast for conditions was a contributing factor in 35 per cent of all fatal accidents in 1960. In some 30 per cent of these cases the individual was violating a speed law. Speed violations were factors in 37 per cent of all fatal accidents. Speed does not necessarily mean 75 miles per hour. The Bureau of Public Roads recently reported that drivers traveling at speeds below 40 miles per hour were involved in accidents at a rate many times higher than that of drivers traveling at faster speeds. This is probably due to the fact that more driving is done at these slower speeds.

Severity of traffic accidents increases with speed. There are, for example, almost three times more injuries in a given number of accidents at 60 miles per hour than at 20 miles per hour. However, this does not mean that any one speed is safer than another. In order for a safe speed to be determined, one must consider the conditions such as other drivers, vehicles, the roadway, and other environmental circumstances.

### NIGHT ACCIDENTS

Night traffic accident rates are double those of daytime rates. About two thirds of all traffic deaths occur at night when just one third of the total mileage is driven. Night accident rates become much higher when speed goes above 50 miles per hour. The hours from 2 to 4 a.m. are the most dangerous period at night. The effects of fatigue, drowsiness, and intoxication are compounded due to the lack of visibility. All of the facts related to nighttime accidents suggest lowering the night speed limits, particularly on rural highways.

### CONDITION OF VEHICLE

The condition of a motor vehicle is more important to the prevention of traffic accidents than is normally suspected. Most drivers give little attention to the fact that their only means of controlling a vehicle is four small rubber areas on the tires. In recent vehicle check programs, one out of six cars inspected was found unsafe and in need of maintenance attention. It is estimated that vehicle defects are a contributory cause in approximately five per cent of the annual total.

### ELEMENTS OF THE TRAFFIC PROBLEM

The previous discussion suggests that there are three major elements in the traffic accident problem. They are the driver, roadway, and vehicle. When analyzing causes of traffic accidents, each cause can be classified under one of these three headings. It has been said that if all cars were as good as the best cars, we might reduce accidents 10 per cent—if all roads were as good as the best roads, we might reduce accidents another 10 per cent—but if all drivers were as good as the best drivers, we possibly could reduce accidents 80–85 per cent. Below is a general discussion of these three elements and the part that they play in traffic accident causation.

#### DRIVER

The driver is the most important single factor in the traffic accident formula. It is the driver who sees, guides, and makes judgments regarding control of the vehicle. The driver's actions in either a simple or complex

traffic situation determine whether the motor car will continue along safety or be involved in an accident. It is the driver who allows himself to become distracted, sleepy, intoxicated, or frustrated while operating his automobile. The ability to think rationally and make decisions on these matters is related to the safe and efficient operation of a motor vehicle. It is no wonder that the driver's errors are responsible for approximately 85 per cent of all traffic accidents.

#### ROADWAY

The roadway is the contributing factor in about 10 per cent of traffic accidents. This is due primarily to physical deficiencies in the road. These might be due to faulty engineering design or a roadway situation that has

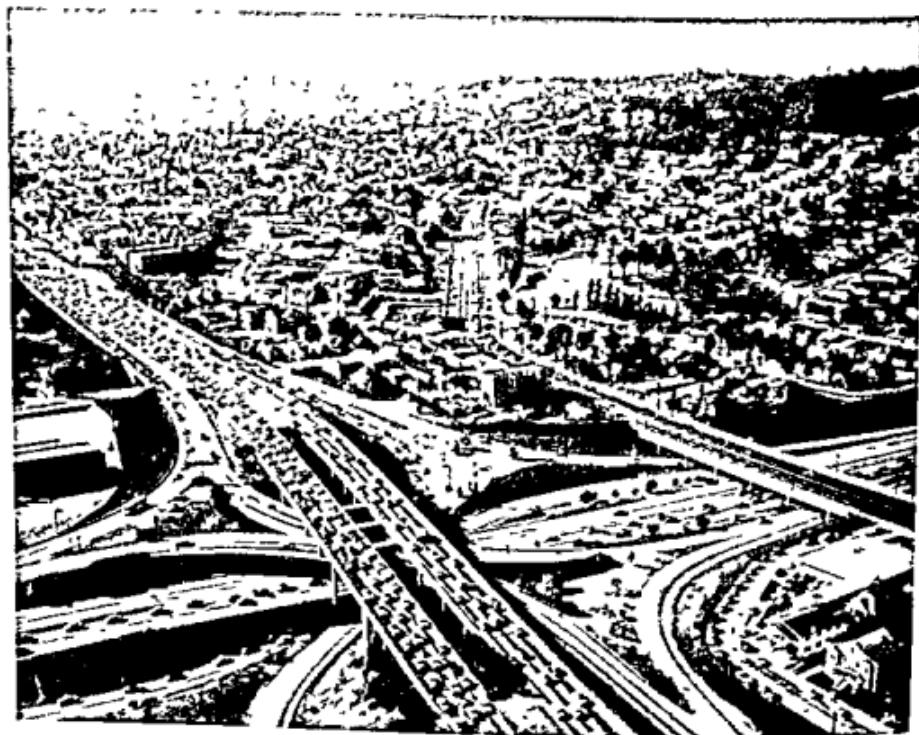


FIGURE 15:3. Modern highways are essential to highway safety.

(Courtesy California Division of Highways)

developed over a period of time. Roadway surface conditions can also be influenced by ice, snow, or rain. These can alter driving conditions and

make the operation of a motor vehicle unsafe. Moreover, construction areas represent a roadway hazard to the unwary driver.

#### VEHICLE

Traffic accidents resulting from vehicle condition are of prime importance. In the past, such accidents were considered to be minor when compared to the human element, with about five per cent of the traffic accidents due to vehicle condition. However, in view of some current studies, the vehicle may be of greater importance than has been heretofore thought. It has been suggested, for example, that the vehicle may be the contributing factor in as many as 20 per cent of all traffic accidents. At this writing these data have not been finalized and should be accepted with reservation. The vehicle, no doubt, is very important to traffic accident causation and the condition of one's automobile should be given careful attention.

#### ESSENTIALS FOR SAFE DRIVING

There are a number of basic essentials for the safe and efficient operation of a motor vehicle. Among the most salient are attitude, knowledge, skill, and good physical condition. Each of these is an important attribute of the safe driver and each is related to the other to a greater or lesser degree.

#### ATTITUDE

Driver attitude is by far the most important single factor in traffic safety. A person may have sufficient knowledge and skill, but if he does not apply these with proper attitudes, he can well become a menace on the highway. One of the most common evidences of poor attitude is discourtesy in traffic. Actions similar to this are generally controlled by one's emotions and are the acts of the emotionally immature. Not only do maladjusted persons react in such a manner, but average drivers under emotional stress can also contribute to the accident toll. Therefore, temporary duress can be as deadly an act from the average citizen as from an individual with an acute problem of personality adjustment. It is essential that drivers of automobiles have socially acceptable attitudes if

the highways of the nation are to be safe. Self-discipline and self-control identify the good traffic citizen.

#### KNOWLEDGE

Adequate knowledge is essential to safe performance behind the wheel of a modern automobile. Gone are the days when the driver could operate the car by instinct or impulse. The driver of today must know and understand (1) the traffic laws of his state, (2) the functioning of the vehicle, and (3) be able to comprehend the physical laws that govern the operation of a motor car. This is basic knowledge for the driver if he is to drive his automobile safely from city to city or from state to state.

#### SKILL

To be an effective driver, you must be able to respond to a variety of complex or unusual traffic conditions. Skill required for normal driving is rarely sufficient to meet the demands of the modern traffic environment. Most adult drivers today have taken very little time to learn the proper techniques of driving. Therefore, a large number of them are unprepared to drive safely on the highway of today. The younger generation has the opportunity to learn correct driving techniques and procedures through accredited high school driver education courses. The driving skill, as well as attitudes and knowledge, of this newer generation should be considerably above that of the typical driver of the 1960's.

#### PHYSICAL CONDITION

Good physical condition is an obvious basic requirement for safe driving. There are many traffic situations that demand split-second decisions and responses. This implies that the body must be in good condition to respond to the commands given it by the mind.

Eyesight is vital to safe driving. Studies have indicated that vision is directly related to safe driver performance. Good hearing also contributes to keeping the driver attuned to the traffic in the vicinity.

#### SAFE DRIVING PRACTICES

The conduct of the driver on the nation's highways is governed by many simple yet essential, safe practices. Regardless of whether he is

driving on a dry straight stretch of road, in inclement weather, or on a turnpike, there are procedures that the driver must follow if he is to arrive at his destination safely. Some of the general procedures for the driver to adhere to are:

1. Assume a straight, comfortable position behind the wheel.
2. Fasten seat belt.
3. Lock all doors from the inside.
4. Check brakes and steering if in a strange car.
5. Plan the trip prior to starting.
6. Keep your eyes moving while driving.
7. Avoid being caught where you could become involved in an accident due to the actions of other drivers.
8. Keep your car moving until it is well off the road.
9. Avoid making rolling stops at intersections.
10. Pass only when there is sufficient room ahead to do so safely.
11. Signal for turns or any lane change.
12. Keep a sufficient space cushion between your car and the one ahead, never tailgate the vehicle ahead.

The above are a few of the general safe practices that should be used by the motorist each time he takes to the highway. For additional safe practices related to defensive driving, weather, night driving, and turnpike driving refer to Figure 15:4.

#### TRAFFIC SAFETY EDUCATION PROGRAMS

In order to combat the rising toll of traffic accidents, it has been necessary to implement a number of traffic safety education programs. Some of these programs have been designed to be offered by the schools while others are community-centered endeavors. These program efforts date back to the early 1920's and have found a place of importance in saving the lives of thousands of school children and adults.

Traffic safety programming, for the most part, is built around the 3 E's concept of traffic safety. This concept introduced in 1923 refers to Education, Enforcement, and Engineering. Figure 15:5 depicts the 3E's principle.

The following programs derive their being from this concept. Each program attempts to fulfill a traffic safety education need either from an educational, engineering, or enforcement point of view.

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## SAFE DRIVING PRACTICES

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### BAD WEATHER

1. Check vehicle condition prior to bad weather season.
2. Have good tires on vehicle—snow tires in winter.
3. Keep windows and windshields clear.
4. Follow at a safe distance.
5. Be alert for pedestrians.
6. Use reinforced type tire chains for snow and ice.
7. Turn steering wheel in direction of skid.
8. Pump brakes to slow vehicle and maintain steering control.
9. Drive at reduced speeds on snow, ice, in fog or rain.
10. Check exhaust pipes to guard against carbon monoxide.

### DEFENSIVE DRIVING

1. Keep your thoughts on your driving.
2. Be ready to yield the right-of-way at unprotected intersections.
3. Plan in advance all lane changes and vehicle maneuvers.
4. Observe parked vehicles for signs of movement from curbing.
5. Be alert for pedestrians crossing between intersections.
6. Never become frustrated due to immature acts of other drivers.
7. Leave yourself freedom to maneuver at all times.
8. Observe the actions of other drivers at all times.
9. Plan your trip before leaving home.

### NIGHT DRIVING

1. Dim instrument panel lights but do not turn them off.
2. Watch road to right when approaching another vehicle.
3. Do not overdrive your headlights.
4. Never stare at center line to guide car.
5. Keep eyes moving to avoid becoming sleepy.
6. Stop frequently on extended trips.
7. Pass only on straight roadways where night distance is adequate.
8. Dim lights when driving behind another car.
9. Never drive at night when fatigued.
10. Make certain taillights are operating.

### TURNPIKE

1. Give full attention to your driving.
2. Merge smoothly with traffic when entering turnpike.
3. Maintain a speed consistent with traffic in your lane.
4. Signal intentions to change lanes.
5. Maintain adequate space cushion between your vehicle and the one ahead.
6. Never slow or stop abruptly.
7. Pull completely off roadway for emergency stops.
8. Stop frequently for a rest or coffee break.
9. Plan to exit well in advance of deceleration lane.
10. Observe traffic signs for driver information while on the turnpike.

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FIGURE 15:4. Safe Driving Practices.

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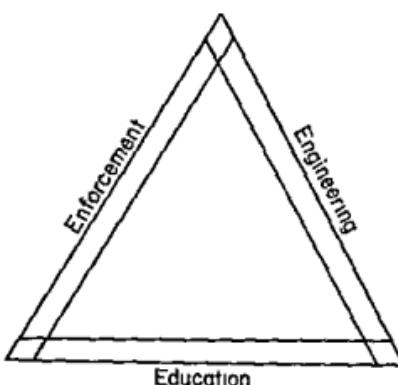


FIGURE 15:5. This triangle shows each element of the three E's as an important segment of a comprehensive traffic safety program. It also shows that, to be most effective, each of the elements must be related to and supported by the other.

#### DRIVER EDUCATION

The driver education program came into existence to assist in the alleviation of the traffic accident problem. Since traffic accidents are a major social problem and the public schools are an agent of society, this program naturally belongs in the curriculum of the secondary school. *Driver education is defined as those learning experiences provided by the schools for the purpose of helping students learn how to operate motor vehicles safely and efficiently.* The typical high school course consists of a classroom phase and a practice driving phase. *The classroom phase is the learning experiences centered in the classroom that not only utilize conventional teaching methods such as lectures, demonstrations, and the like, but also make ample use of laboratory exercise and field study in traffic.* *The practice driving phase is that phase of driver education which provides learning experiences for the student as a practice driver behind the wheel of a dual-control automobile.*<sup>4</sup>

Driver education courses are now being offered by approximately 50 per cent of the nation's secondary schools. These courses are for the most part meeting the minimum standards of 30 clock-hours of classroom instruction and 6 clock-hours of practice driving instruction. It is suggested that this minimum number of hours is insufficient, and it is recommended by state driver education associations that the driver education course be

<sup>4</sup> State of Illinois, *Driver Education for Illinois High Schools* (Springfield, Ill.: Office of Public Instruction, 1963), p. 9.

a complete semester program with a minimum of 8 clock-hours being devoted to the behind-the-wheel phase.<sup>5</sup>

Each year approximately 3 million young people reach legal driving age. Since four out of five of these will drive before they reach their 25th birthday, it is imperative that they learn how to operate a motor vehicle safely and efficiently. Driver education courses are designed to develop wholesome attitudes, sufficient skill, and proper driving habits. If these young potential drivers are given the opportunity to enroll in such a course, the likelihood of their being involved in a traffic accident is reduced considerably. Most driver education courses use a textbook as the basis for classroom study. There are a number of textbooks suitable for this purpose and, in most cases, they contain units of study related to (1) the accident problem, (2) history of the automobile industry, (3) attitudes and driving, (4) natural laws, (5) man-made laws, (6) teen-age driving patterns, (7) traffic engineering, (8) driving on urban and rural highways, (9) turnpike driving techniques, (10) and driver characteristics (including the use of alcohol and drugs).<sup>6</sup>

**TEACHER QUALIFICATIONS.** The key to providing a successful driver education course is having a well-qualified teacher. The teacher of driver education should be as well prepared in his field as any other teacher in his area of specialization. It has been suggested that before the quality of driver performance can be upgraded to a measurable degree, an attendant upgrading of driver education teacher certification requirements must also take place.<sup>7</sup> Teacher certification standards vary across the nation. The present recommendation is that all teachers of driver education should possess at least a minor in driver and safety education.

**FINANCIAL AID.** The offering of a driver education course costs, on the average, between 20 and 50 dollars per student. This is no more than other courses where a laboratory phase is required. It is recommended that the cost of the driver education program be financed through the general school budget. However, in order to encourage school systems to offer high-quality courses and help defray a portion of the expenses incurred, driver education financial aid programs have been offered in recent years. To date, 24 states reimburse their public schools a part of the expenses incurred in offering a minimum driver education course.

<sup>5</sup> National Commission on Safety Education, *Policies and Practices for Driver Education* (Washington: National Education Association, 1960), pp. 32-35.

<sup>6</sup> Refer to Strasser, et. al., *When You Take The Wheel* (River Forest, Ill.: Laidlaw Brothers, Publishers, 1961).

<sup>7</sup> James E. Aaron, "Are You A Safety Educator," *Safety Education*, Mar. 1960, p. 25.

Coupled with financial aid programs is the trend to require a driver education course prior to licensing. Five states are now requiring persons under 18 years of age to complete a driver education course before they can apply for their driver's license. Due to the fact that most national and state organizations interested in traffic safety are supporting this move, the enactment of legislation to invoke such a requirement seems to be certain in many additional states in the years immediately ahead.

### **THE ACTION PROGRAM**

The greatest challenge in traffic safety is putting available knowledge to work. Traffic victims would be accumulating in even greater numbers if it were not for the concentrated efforts of many national and state agencies, public officials, and safety-minded individuals. The success of today's traffic safety efforts is the result of the application of the basic techniques of the Action Program. The 3 E's concept of traffic safety, introduced in Chapter 1, was conceived in 1923 and sowed the seeds for the action program. Since that time the Action Program has evolved into the fundamental program of the President's Committee for Traffic Safety. The following are the basic ingredients of the Action Program:<sup>8</sup>

1. Laws and Ordinances.
2. Accident Records.
3. Education.
4. Enforcement.
5. Engineering.
6. Motor Vehicle Administration.
7. Public Information.
8. *Organized Public Support.*
9. Traffic Courts.

The results of the organized highway safety movement have been impressive. Between 1924 and 1946 the national traffic fatality rate was cut approximately in half. The mileage death rate was cut more than half again between 1946 and 1961. All in all, the traffic death rate has been cut from 18.2 deaths to 5.3 deaths per 100 million vehicle miles. Through a more thorough application of the Action Program principles, the traffic death rate of the future should be lowered further.

**ANNUAL INVENTORY.** The Annual Inventory of Traffic Safety Activities is one of the approved inventories to measure progress in the application

<sup>8</sup> The President's Committee for Traffic Safety, *Highway Safety Action Program* (Washington: The Committee, 1962).

of the Action Program. The inventory, sponsored by the National Safety Council, is designed to assist cities and states assess their total traffic safety efforts. The Council, working with the proper state agency, encourages all local municipalities with a population of more than 5,000 to participate in the inventory analysis. Areas assessed in the inventory are essentially those listed under the discussion of the Action Program. Through a careful study of these points, it seems evident that a city or state can raise the quality of its traffic safety efforts if a conscious attempt is made to apply the principles of the inventory program.

**NATIONAL HIGH SCHOOL DRIVER EDUCATION ACHIEVEMENT PROGRAM.** The National High School Driver Education Achievement Program is another of the inventories intended to determine if progress is being made in the utilization of the Action Program. This program, sponsored by the Insurance Institute for Highway Safety, is designed to evaluate the total driver education effort of the nation. Each state participates on a voluntary basis. The state forwards its analysis to the Institute, where every aspect of the program is evaluated and compared with other states. On the basis of its score, a state may win an Award of Excellence, Award of Achievement, or Award of Progress. Through participation in this program inventory, each state contributes to the assessment of the driver education program of the nation, thus enabling a complete evaluation to be made on which the weak or strong points of driver education can be identified.

**PEDESTRIAN PROTECTION PROGRAM.** The Annual Pedestrian Protection Program is sponsored by the AAA. This is another program developed in the interest of evaluating the application of the Action Program principles. Unlike the two previously discussed inventory programs, this analysis is concerned only with pedestrian safety practices. Through the use of the Pedestrian Protection Program a community can determine the scope of its activities related to the protection and education of pedestrians. Each community appraises such activities and submits a completed analysis to the local AAA's affiliated motor club which rates and compares the results with other communities of comparable population. It is possible for programs with a high score to win one of the many awards available.

#### BICYCLE SAFETY

Bicycle safety is one aspect of a comprehensive traffic safety education program. Such a program is concerned with the education of elementary and junior high school students. However, today bicycle clubs for adults

miles of turnpike driving, compared to 5.3 on other highways. In order to achieve greater safety, highway designers must consider human behavior and vehicle performance. Concepts of roadway design develop from experience and research. From these observations come new designs, and old highways are modified. In each case these are studied, re-evaluated and altered as necessary. More and more traffic engineers are studying the psychology and physiology of the drivers. They recognize that highway design should be adapted to the driver's sensory and physical capabilities and co-ordinations, his mental reactions and powers.

The basic provision that must be built into a highway is capacity—the ability of the road to accommodate traffic. Capacity is measured in terms of the number of vehicles passing a given point in a given period of time. Building proper capacity into a highway means providing those elements that enable traffic to use the highway as it wishes and with reasonable speed. It is evident that capacity is a concomitant of safety. Thus, through the use of traffic engineering skill, highways are made safer for the movement of vehicles from one point to another. This is the application of the second E of traffic safety engineering.

### TRAFFIC LAW ENFORCEMENT

The purpose of traffic law enforcement is to offset selfish motivation and to condition community habits by conditioning the habits of individual residents. In addition, traffic law enforcement controls for the common good of everyone the 15 per cent of all persons who violate traffic laws. Enforcement of traffic laws is considered one of the three basic areas of highway traffic safety, along with education and engineering. A fundamental objective of enforcement is to protect highway users and to keep traffic moving safely and efficiently. Throughout the years, experience has shown that strict and fair enforcement is a rapid and certain way to reduce accidents. The accident curve tends to turn downward as the number of arrests, warnings, and convictions increase. In order to accomplish a high level of enforcement activity, traffic law enforcement agencies should use the many modern techniques and methods available today. If these ends are to be met, the local enforcement agency must be well organized and staffed with competent officers who have a high degree of education and training. It is evident that traffic law enforcement is a vital link in the lowering of the traffic accident rate; therefore, it must be developed as an integral part of the nation's street and highway transportation program.

## ADULT EDUCATION

Chapter 18 discusses in depth the nature and scope of safety programs related to adult and higher education. Driver education courses, traffic court schools, and driver improvement classes are among those considered in that chapter. However, there is one aspect of adult traffic safety education that needs to be emphasized at this point. This is the problem of the aging driver.

Special attention to the problem of the older driver becomes meaningful when a few population facts are revealed. Between 1940 and 1959, the number of drivers 65 and over increased about 3 per cent. This increase made the total of such operators approximately 6.8 per cent of all drivers. This means that today there are four times more drivers age 65 and over than in 1940. The number approximates about 5.71 million. These data are easy to understand when one realizes that the average life expectancy now approaches 70 years for the males and exceeds 70 for females.

To date the problems of aging drivers have not been studied in sufficient detail. However, one fact stands out: the average reaction time of the older adults slow down markedly. While the average reaction time is three quarters of a second, many aged adults find theirs to be a full second. Indeed there are many problems for the aging driver. The following are warning signals that indicate careful attention must be given to physical condition:

1. Failing vision—details of the driving environment are not as clear as they used to be.
2. Stiffness of joints—especially after a prolonged period of driving.
3. Hearing fails—inability to hear well begins to be noticeable.
4. Inability to concentrate wholly on the driving task for any length of time.
5. Reaction time grows slower.

## TRAFFIC ENGINEERING

A great potential for gain in highway safety seems to lie in better roads. Therefore, one of the major objectives of traffic engineering is the design of highways that will carry people and goods rapidly, comfortably, economically, and safely from their origins to their destinations. A recent study reveals that traffic fatalities on turnpikes are less than half those on conventional highways. There were 2.4 deaths per 100 million vehicle

license is that of privilege. It is a privilege granted by the state to the citizen desiring to operate a motor vehicle legally on the streets and highways of the state. Today all states require licenses for their drivers.

The primary purpose of licensing drivers is to increase highway safety. Additional purposes served are: (1) to identify the driver to the police; (2) to identify the driver to insurance investigators and other drivers in case of an accident; (3) to collect revenue from the fees to pay for licensing, policing, driver education, or highway construction. Driver licensing as it influences accident trends is based on the following observations. Many individuals who want to drive would be poor risks on the highway; therefore, some means must be provided to protect normal highway users. It is possible to evaluate driver risks through the license instrument. Lastly, it is possible to specify what degrees of risk the state should tolerate in drivers. Through the application of these practices the control of the driver population is enhanced.

## SEAT BELTS

Research in the field of traffic safety indicates that the use of seat belts can assist in the lowering of the highway transportation death rate. The Traffic Safety and Highway Improvement Department of Ford Motor Company estimates that "seat belts are responsible for one-third to two-thirds fewer injuries and up to four-fifths fewer deaths."<sup>9</sup> The National Safety Council reports that 5,000 lives could be saved yearly by using seat belts. Commercial airlines have used seat belts to advantage for many years and there is no reason why their use should not be a standard procedure in every motor car in America.

In order to encourage the installation of seat belts, the automobile industry in 1962 began to manufacture all major domestic passenger cars with seat belt hardware in their front seats. Now the buyer will be able to purchase belts and personally attach them to the anchors at a relatively low cost. The Robert's Bill requires that all vehicles purchased for the Federal Government be equipped with seat belts. The use of seat belts provide protection in a number of ways. They prevent ejection from the vehicle, lessen injury from inside, spread the impact force, extend the stopping distance, and absorb part of the impact force. There are seat belts installed in nearly 4.5 million vehicles today. However, much needs to be done toward educating the public to use the belts at all times and

<sup>9</sup> Ford Motor Company, *The Big Plus Seat Belt* (Dearborn, Mich., Ford), p. 9



FIGURE 15.6. Traffic law enforcement is basic to highway safety.

(Courtesy Southern Illinois University Photo Service)

### DRIVER LICENSING

One area of the traffic problem in need of firm control is driver licensing. Laws generally provide for examination of drivers and restriction of licenses. The fundamental principle underlying the granting of a driver's

## MOTOR FLEET TRANSPORTATION

The development of the motor fleet industry ushered in the greatest economic era that this nation has ever experienced. "In the relatively short period of fifty years a rapid, efficient mode of transportation had developed, fostering economic growth, speeding up production, and opening broad new potential markets for innumerable products from many areas. Numerous isolated communities throughout the country were rapidly engulfed in the socio-economic pattern of national life."<sup>10</sup>

Trucks transport most of the tonnage moved from one section of the nation to another. The use of motor trucks has enabled all phases of agriculture to expand their sphere of contact. Thus, fresh fruits in California, Florida, or Texas are available to the northern states the year around. Industry and other commercial pursuits rely on this type of transportation to move their products over great distances in a relatively short period of time.

The motor fleet industry also has pioneered in the development of traffic safety education programs. This industry was the first to recognize that adult driver education programs would pay off in lives saved and in the saving of large sums of money for the industry. The principle of economics and safety programming was developed as a result of commercial fleet's interest in traffic safety. Today the major motor fleets of the nation conduct programs of driver education, driver supervision, efficient terminal management, and others in the interest of highway safety.

## THE HIGHWAY SYSTEM

During the early days of the current century the nation's highway system was made up principally of a few brick highways and many miles of dirt roads. With the increase in vehicle usage, it became evident that an attendant increase and improvement of the highway system was a vital link to the success of highway transportation. Highway construction has traditionally been the responsibility of the cities and states. However, the Federal government began to participate in highway improvement programs as early as 1891. With the passing of the Federal Road Act of 1916, the national government initiated action that resulted in the develop-

<sup>10</sup> Marland K. Strasser, *The Development of a Program of Driver Selection, Training, and Education for Commercial Motor Vehicle Fleets*, Dissertation (New York University, 1949), p. 7.



FIGURE 15:7. Seat belts are modern aids to the saving of lives on the highways.

(Courtesy Dodge Photo)

to encourage the remaining car owners to install and use this life-saving device. It would be well for schools, municipalities, businesses, and industries to organize extensive public education programs designed to promote the use of seat belts. Beginning in January 1964 manufacturers began installing seat belts in the front seat as standard equipment in all cars.

## ACTIVITIES

1. Conduct a survey of your campus commuters and determine what percentage are using seat belts. If the number is relatively low, explore the possibility of organizing a seat belt campaign.
2. Make a comprehensive analysis of your state's driver education program. Discuss in class the strong and weak points as based on the National High School Driver Education Achievement Program.
3. Develop a comprehensive public relations program designed to "sell" driver education to a community.
4. Research the topic of "attitudes and driving" and develop a teaching unit on the subject for presentation to a senior high school assembly.
5. Visit the local or state highway departments and interview the chief highway engineer. Determine number of miles and type of highways for which he is responsible. Note the problems of cost, maintenance, and accident frequency.
6. Collect information on the Annual Inventory of Traffic Safety Activities and be prepared to participate in a class panel discussion.

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ment of the Federal-Aid-Systems. This law provides for apportionment of funds by a fixed formula among the states. Up to 50 per cent of the construction costs are paid for out of Federal-Aid funds and 50 per cent by the state. In the case of the new National System of Interstate and Defense Highways, the Federal government contributes 90 per cent of the cost.

There are presently 798,000 miles of highways in the Federal-Aid System. These include 235,000 miles in the Federal-Aid Primary System and 543,000 miles in the Federal-Aid Secondary System. There will be 41,000 miles in the National System of Interstate and Defense Highways when this program is completed in the early 1970's. At that time a person will be able to drive at 60 miles per hour from coast to coast and never be confronted with a stop light. It is estimated that 9,000 lives, 5 billion dollars in motorists cost, and 4 billion vehicle hours will be the annual savings that can result from the completion of the Interstate Highway System.

## SUMMARY

The motor-vehicle traffic accident problem is one of America's major socio-economic problems. Traffic accidents account for approximately 40,000 lives a year, 1.7 million injuries and in excess of 6 billion dollars in economic losses. The driver, roadway, and vehicle are the major elements in the highway transportation accident phenomenon. The driver, due to improper attitudes, commitment of unsafe acts, and the use of poor judgment, causes about 85 per cent of all traffic accidents. Moreover, the 15- to 24-year-old age group is responsible for the greatest majority of traffic deaths per miles driven.

Programs of driver education, bicycle safety, and others have been developed to help impede the traffic death rate. In general, all traffic safety safety education programs are based on the 3 E's concept of traffic safety—education, engineering, and enforcement. The Action Program is designed to provide a basis for co-operative traffic safety programming at municipal and state levels.

The development of a nationwide system of highways has been a valuable asset to the progress of the country's transportation industry. Lives saved and the extension of agricultural and commercial interest are among the many values derived from the development of the highway system.

fire.<sup>1</sup> Headlines and stories such as the following appear much too often in our daily news media across the nation:

#### FAMILY OF TEN DEAD IN FIRE Marrilton, Ark.

A family of 10, including eight children, perished when a windswept fire gutted their colonial farm home in the pre-dawn today.

The victims were Mr. and Mrs. John Franklin, in their 40's, and their children, Phillip, 12, David, 11, Beverly, 10, William, 9, Carolyn, 8, Ralph, 6, Jan, 5, and Terry, 3.

Sheriff George Adams said the fire was discovered by a neighbor who told officers the two-story house was destroyed when he arrived.

All that remained was the smoldering foundation of the one-time show place home, 25 miles north of Morrilton.

Eight bodies were recovered and a search was being made in the debris for the other two. Those recovered were burned beyond recognition, officers said.

Cause of the fire was not determined.

### THE NATURE OF FIRE

A basic knowledge of the nature and composition of fire is necessary for one to understand and appreciate its constructive and incendiary powers. Despite our long familiarity with fire, gaps and conflicts still exist in lay comprehension of what it is and how it acts.

### COMBUSTION

*Combustion is normally defined as the chemical union of a substance with oxygen in such a manner that it generates heat and light. For this occurrence to take place a three-part condition is required. There must be (1) heat, (2) fuel, and (3) oxygen. Without these elements combined in proper balance, combustion or fire cannot occur. The fire triangle, Figure 16:1 illustrates the principle of this relationship.*

The kindling temperature of materials and the flash point of various substances differ, therefore, making it difficult to establish a single rule to cover all situations where fire is possible. *The kindling point of a material is the point at which enough heat accumulates to cause the material to be ignited. Generally this is a slow process. The flash point is that temperature at which a flammable material will flash in air. Many times an*

<sup>1</sup> National Safety Council, *Accident Facts* (Chicago: The Council, 1960).

## Fire Prevention and Protection

THE NATION'S annual loss of life and property resulting from fires points up the need to construct a sound and continuing educational program of fire protection and prevention for schools and the public. Whether they realize it or not, all citizens live daily under the threat of fire—at home, at school, at work, and at play. Children are exposed to this threat when they are with their parents, when at play, and for a third of their waking hours when, by law, they are placed in the hands of the school each day.

Historically, fire has been a valuable servant of man when wisely used. Fire is utilized to heat homes, cook meals, make gasoline and oil, change ore into steel, and produce synthetics. It also contributes to the production of power to fly jets and missiles and propel automobiles and trains. In fact, almost everything around us, in some way or other, is produced or affected by fire. Fire is a servant of man as long as he remains its master.

The yearly fire losses make it obvious that society does not profit from and control the phenomenon of fire as it should. For each year since the recording of the disastrous Chicago Fire, October 9, 1871, fire losses to the nation have mounted to astronomical proportions. The Statistical Division of the National Safety Council reports that annually we have in this country approximately 1.2 million building and nonbuilding fires. Moreover, each year the economic losses incurred from fire are reported to be in excess of 1 billion dollars. It is noted, however, that the really disastrous effects of uncontrolled fire are the loss of life itself. Each year some 7,000 lives are taken due to human carelessness and/or misuse of

of Sciences—National Research Council states that "almost always it remains true that 'where there's smoke, there's fire.'"<sup>2</sup> *Smoke is a suspension in a gas of small liquid or solid particles.* Smoke is more important in fire deaths than is generally understood. It can be authoritatively stated that more fire deaths result from asphyxiation due largely to smoke than from actual burns. Post-mortems of fire victims bear this out repeatedly.

### FLAME

Another important component of fire is that luminous characteristic called flame. The flame is our most obvious visible warning that a fire has begun. In contrast to smoke or gaseous warnings, which may be detected some distances from the actual seat of the fire, a flame gives the precise location of the fire. However, certain types of fires can develop although there is no evidence of flame.

### FLAME SPREAD

It is a desirable practice to select materials for construction purposes that have slow flame-spread qualities. Materials range in their ability to retard the spreading of flame. If building materials with a rapid spread capacity are used, it is simply adding "fuel to the fire." Examples of materials with slow flame-spread qualities are asbestos-cement board, plaster, and ceramics. Conversely, soft woods, untreated composition panels, and certain decorations have rapid flame-spread qualities. Therefore, caution should be exercised in the selection of construction and decorating materials.

### GASES

The chemical reaction of combustion does produce a variety of gaseous products, many of them very toxic with capacities to affect the human body in a deleterious way. The gases most frequently found in fire are carbon dioxide and carbon monoxide. Other gases such as ammonia, hydrogen chloride, hydrogen cyanide, oxides of nitrogen, phosgene, and sulfur dioxide may also be present. Some of these gases have the capacity to stimulate respiration, thereby increasing the amount inhaled, while others

<sup>2</sup> National Academy of Sciences, *School Fires and Approach to Life Safety* (Washington: The Academy, 1960), p. 11.

incendiary condition may develop in circumstances that appear to be safe and harmless to one unwary of certain kindling and/or flash point thresholds. Since this is common in the daily affairs of living, it is incumbent on all persons to learn as much as possible about the chemistry of combustion.

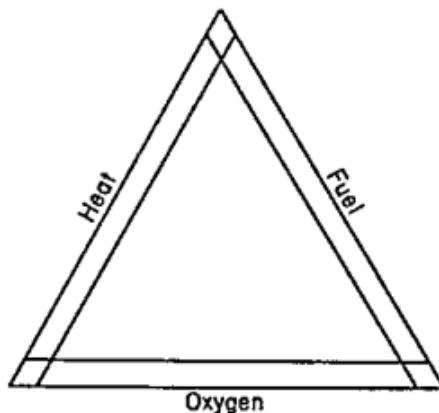


FIGURE 16:1. The fire triangle.

It should be recognized that the most common materials around us are flammable. Items such as paper, clothing, curtains, and furniture are among the most flammable substances found in the home, at the office, or in places of business. Additional materials that should receive special consideration are oil, gasoline, household cleaning fluids, and flammable solvents. Especially to be noted is the fact that many of the newer hair sprays, insect repellents, and spray paints are highly volatile and, therefore, can cause fire to break out at the least expected time.

Spontaneous combustion may occur if certain basic rules of storing vegetable base materials, such as oily rags, moist hay and grain, and so forth, are not followed. This condition is produced when such materials are allowed to collect. Subsequently, heat is generated and, if permitted to accumulate, the materials will reach their ignition temperature and then burst into flame. This is another characteristic of combustion that everyone should understand in order to eliminate many needless fires.

#### SMOKE

Most fires have one thing in common—smoke. Even deep-seated, undetected fires produce a certain amount of smoke that may or may not be visible to the naked eye, even from close range. The National Academy

of Sciences-National Research Council states that "almost always it remains true that 'where there's smoke, there's fire.'"<sup>2</sup> *Smoke is a suspension in a gas of small liquid or solid particles.* Smoke is more important in fire deaths than is generally understood. It can be authoritatively stated that more fire deaths result from asphyxiation due largely to smoke than from actual burns. Post-mortems of fire victims bear this out repeatedly.

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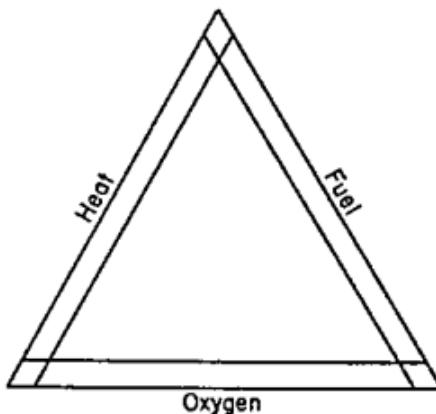


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more than a breath or two of moist air at such temperatures without some harmful outcome.

The factor of heat cannot be overlooked as a serious threat to life. For this reason it should be realized that heat ignites other fuel sources and keeps a fire alive, thus allowing fire to spread from one area to another.

### THE WHERE, WHEN AND WHY OF FIRE CAUSES

Someone once said, "fires don't just happen, they are caused." This cause may be some careless act, a misunderstanding of what conditions may produce a fire, or some deliberate flouting of safe fire practices. It sounds unbelievable that members of the human family act in such irresponsible ways, but the fact remains that every 12 minutes a life is taken by fire and approximately \$25,000 worth of property is destroyed.

The causes of fires are varied and many, and range from very simple to complex origins. In each case, however, cause is not relative and can be accurately determined. By the same token, certain safe practices and preventative measures are also known. These, with the application of known safety criteria, can cut fire losses drastically. The National Safety Council recognizes over 25 unsafe practices and conditions that cause fire. Most of these are related to everyday habits and practices. It is unfortunate that human beings, due to personal negligence, contribute to the loss of life and property.

The astounding national loss of life and property resulting from fires of careless origin makes imperative a better understanding of the causes of fire. The following is a discussion of the major causes of fire as reported by the National Safety Council in its annual publication, *Accident Facts*.

#### ELECTRICAL

The misuse of electricity is the principal cause of fire in the United States. One in eight fires of known causes is of electrical origin. The overloading of circuits, the use of improper fuses, faulty wiring and equipment are among the most frequent generators of electrical fire. Defective cords, plugs, and power-consuming appliances also contribute substantially to the approximately 120,000 electrical fires causing some 193 million dollars worth of damage yearly.

serve as depressants that slow down breathing to the point of paralyzing respiratory functions with the possible consequence of suffocation. From the standpoint of detection on the part of human beings, it is important to know that some gases, such as hydrogen sulfide, give warning by way of strong odor while others, such as carbon monoxide, are odorless as well as invisible. In addition, it is important to know that all gases do not rise, as is the common belief. Phosgene, for example, is heavy enough to hug the floor, therefore complicating standard escape and evacuation practices.

Without a doubt, gases play an important role in fire deaths each year. The lack of understanding and information concerning gas characteristics contributes substantially to the annual toll. A concerted effort should be made to alleviate this condition through education of school children and the general public.

#### HEAT

The most apparent hazard to life in a fire is heat. It can inflict severe burns that threaten the preservation of life. Obviously, direct exposure to a searing flame produces injury to body tissue. However, there may be other physiological effects of heated air that have comparable, serious consequences. For example, the National Academy of Sciences-National Research Council, points out that "dehydration, heat exhaustion, and blockage of the respiratory tract may be immediate results, and experimental studies and autopsies have shown lung damage, reduced blood pressure, peripheral vascular collapse and heart failure following extended exposure."<sup>3</sup>

Many times, individuals will enter burning buildings in an attempt to rescue stranded persons, or to explore the premises to determine the seat of the fire or to investigate some isolated portion of the building where individuals were reported seen at some earlier hour. In each instance the fireman, father, or friend is taking a chance of snuffing out his own life. The building may look innocent but the unknown menace of heat may be present at a sufficiently high temperature to imperil one's life. The National Fire Protection Association states that "considering what is now known, it has been suggested that under fire conditions in buildings, no one should enter atmospheres heated above 120°-130°F. without special protective clothing and mask."<sup>4</sup> Furthermore, human beings cannot inhale

<sup>3</sup> *Ibid.*, p. 13.

<sup>4</sup> *Ibid.*, p. 13.

It is a shocking fact that careless smoking is responsible for 17.2 per cent of all home fires. The real and potential danger of smoking and matches cannot be overemphasized.

Matches in the home are very useful in lighting stoker fires, cigarettes, rubbish, and leaves. Their careless use, however, can turn an otherwise safe home or business into a smoldering ruin. Carelessness in smoking and use of matches is most often the cause of the yearly 160,000 fires resulting in fire losses of 76 million dollars.

### **FLAMMABLE LIQUIDS**

Many liquid materials used every day in the home, at work, or in places of business are flammable. (Flammable and inflammable mean the same.) A lack of knowledge of the deadly potency of such substances can cause a raging inferno to develop in a matter of seconds. Cleaning fluids, gasoline, oil, paints, turpentine, varnish removers, and kerosene are among everyday household items that, through human carelessness and errors, cause about 41 million dollars worth of fire losses annually.

The lack of proper control and the insistence that certain minimum safety measures be taken while using blow torches, welding and/or cutting equipment are responsible for a good percentage of the 57,600 flammable liquid fires reported each year. In the home or on the job, needless chances are taken when some relatively basic safe practice would have prevented dramatic fires from occurring. Flammable liquid and gas substances are safe if they are used wisely. It is up to the individual to know and to follow specified safe practices in the use of flammable liquids.

### **SPONTANEOUS COMBUSTION**

Good housekeeping is a must if fires that seem to develop "out of nowhere" are to be prevented. Spontaneous fires may burst out in rubbish piles, boxes of old clothes, oil dust cloths, or in paint rags. As stated previously, such materials allow heat to accumulate to that temperature at which it ignites and bursts into flames. Each year there are approximately 23,000 fires of this type; these fires should never have been allowed to commence. If all persons at home or at work would store such items as mentioned above in metal, air-tight containers, they could significantly cut down the 30 million dollars in fire losses of this type every 12 months. Fires that develop due to spontaneous combustion should be the

## HEATING AND COOKING

A large percentage of fires result from the use of defective heating and cooking equipment. Today, most of these units are operated by gas or electricity. In each case they represent a destructive force in homes, schools, or places of business. They are particularly hazardous when wooden shelves are built around them, when they are placed too close to curtains or paper shelf-liners, or when such equipment is allowed to become defective. The kitchen should be a safe and enjoyable place to work. However, in many homes the opposite is true. Many home fires are the result of grease catching on fire, either in a piece of cooking equipment, in a grease container, or accumulated grease on the stove.

Defective chimneys, flues, and stove pipes are the most common causes of fires related to heating equipment. It seems that individuals do not recognize deterioration of such equipment in time, or perhaps they are negligent in the maintenance and/or periodic inspection of these items. The lack of serious concern on the part of home owners is perhaps the most important reason why there are approximately 140 million dollars in fire losses in some 202,000 heating and cooking fires each year.

## OPEN FLAMES AND SPARKS

The burning of leaves and other materials in open areas appears to be an innocent activity. However, when this is done without due regard for environmental conditions, a disaster could be the end result. A bit of breeze can cause hot sparks to move from one area to another at a moment's notice.

The flying sparks from machines or welding and cutting tools can cause havoc in a moment. It is very important that care be exercised as to when, where, and how materials are burned or some job task performed. Each year there are some 53,000 fires caused by open flames and flying sparks. These seemingly harmless everyday activities cause about 76 million dollars worth of fire losses annually. The omission of elementary preventative measures is the causative factor in these harmless, yet so destructive, enterprises.

## SMOKING AND MATCHES

Smoking is a commonplace human indulgence today, and matches and cigarettes are discarded with little thought of the potential consequences.

### FOREST FIRES

Each year about 30 million acres of forest, grass, and watershed land are destroyed by fire. This is an area equal to the entire land area of the New England states. It is reported that there are approximately 104,000 forest fires each year, with an economic loss in excess of 168 million dollars.

Lightning is one of the major causes of forest fires, and it must be considered as a serious threat to wooded areas of all sizes. The casual act of throwing away a lighted cigarette creates numerous forest fires each year. The hunter and camper who rely upon our nation's forests as the source of their activities and pleasure are the "sowers of seed" of many forest fire disasters.

### INCENDIARY, SUSPICIOUS

Many fires are deliberately set by individuals. It is difficult to determine precisely how many such fires occur each year. However, it is reported that some 20,300 go on record annually as being possible "incendiary, suspicious" fires. This means that there are persons who, with a personality maladjustment or revenge motive, ignite fires on a premeditated basis. These fires cause approximately 28 million dollars worth of losses in an average year. Since this is a very difficult type of fire to anticipate, citizens should be alert to all unusual actions by strangers and known pyromaniacs. By reporting such behavior to proper authorities, many fires can be headed off before they cause a disaster.

People set fires for other reasons than stated above. Insurance companies have learned that people deliberately set fires to collect an insurance premium. This type of behavior constitutes fraud and is handled as such by the courts.

### RUBBISH

Rubbish fires of unknown origin are very frequent occurrences in these United States. Approximately 7.9 per cent of all home fires are caused by piles of rubbish in the attic, closets, garage, basement, or utility room. All kinds of combustibles are found in these locations. Old papers, magazines, furniture, oily rags, and items that "just can't be thrown away" cause

concern of all people, since they leave a trail of destruction and cost in lives that are a complete waste of natural and human resources.

### CHILDREN AND MATCHES

Matches often get into the hands of individuals who are not aware of their potential destructiveness. Principally, these are very young children.

Young children and matches do not mix. It is an observed fact that children love to play with matches and to be around fires. There is a certain fascination about fires that tends to capture the imagination and interest of a growing child. The colorful flames paint a picture that is exciting and pleasant to watch. There are approximately 35,000 fires each year due to the acts of small children who are unwary of the incendiary force of fire out of control. Children, playing with matches and cigarette lighters, experiment with materials so they may see the pretty flames. This type of guileless activity leaves a 22.3 million dollar path of destruction across the country each year.

### LIGHTNING

Most people today do not regard lightning as a serious threat to life and property. The superstitious nature which kept persons in a state of suspicion and fear for many centuries has faded, and now the destructive power of lightning is regarded by most as simply a streak of light passing through the sky during inclement weather. However, this "old-fashioned killer" is a force that does need to be reckoned with today. The Lightning Protection Institute reports that 600 lives are taken yearly, and property damage amounts to an excess of 100 million dollars.<sup>5</sup> The National Safety Council further reports that lightning causes approximately 30,000 building fires, which account for approximately 26.5 million dollars worth of property damage each year. Moreover, lightning is one of the leading causes of forest fires.

Approximately 40 per cent of all fires in suburban and rural areas are caused by lightning. The naive suburbanite or unconcerned farmer finds it difficult to realize that one bolt, or about 25 cents worth of electricity, can burn a costly house or barn to the ground. Lightning may be old-fashioned to many people, but it has as much destructive power as most modern innovations used in the 20th century.

<sup>5</sup> Lightning Protection Institute, *Lightning Facts and Figures* (Chicago: The Institute, 1960), p. 1.

Cause	Number of Fires	Loss	Occupancy	Number of Fires	Loss
<b>Total*</b>	<b>890,260</b>	<b>\$1,139,700,000</b>			
<b>Electrical</b>				<b>890,260</b>	<b>\$1,139,700,000</b>
<b>Fixed services, fires due to wiring, equipment, etc</b>	129,900	187,000,000	Residential	627,100	415,800,000
<b>Power consuming appliances</b>	53,400	48,000,000	Dwellings, one- and two-family Apartments	563,000	346,200,000
<b>Heating and cooking</b>	209,300	183,600,000	Hotels	35,400	36,400,000
<b>Equipment, defective or overheated</b>	137,700	112,400,000	Trailers, trailer courts	10,200	16,000,000
<b>Chimneys, fires defective or overheated</b>	40,400	27,600,000	Other (motels, rooming houses, etc.)	7,100	8,500,000
<b>Hot ashes and coals</b>	20,100	15,000,000	Storage	11,400	8,700,000
<b>Combustibles near heaters</b>	11,100	8,600,000	Barns and other farm property	111,100	213,700,000
<b>Open flames and sparks</b>	58,400	77,000,000	Grain elevators and storage	75,300	104,900,000
<b>Welding and cutting</b>	6,400	20,000,000	Garages, residential parking	4,000	39,100,000
<b>Sparks from machinery, friction</b>	6,600	12,100,000	Lumberyards	22,300	19,700,000
<b>Sparks on reef</b>	10,300	5,600,000	Other storage	1,000	9,300,000
<b>Thawing pipes</b>	3,600	4,100,000	Industrial	7,600	40,700,000
<b>Miscellaneous open flames and sparks</b>	31,500	35,200,000	Food, food products	47,900	198,400,000
<b>Smoking and matches</b>	141,200	69,500,000	Wood, wood products	7,600	30,900,000
<b>Flammable liquid fires and explosions not reported</b>			Chemical, chemical products	3,900	26,800,000
<b>In heating and cooking</b>	58,900	51,800,000	Metal, metal products	2,300	19,600,000
<b>Incendiary, suspicious</b>	23,900	30,500,000	Other industrial	2,600	15,900,000
<b>Lightning</b>	25,500	30,300,000	Mercantile and office	31,500	105,200,000
<b>Children and matches</b>	38,600	29,800,000	Stores	48,400	125,700,000
<b>Spontaneous ignition</b>	20,000	25,300,000	Offices and banks	7,500	48,100,000
<b>Gas fires and explosions not reported in heating and cooking</b>	10,700	16,400,000	Services (barber shops, etc.)	6,700	21,200,000
<b>Rubbish, source of ignition unknown</b>	53,900	10,800,000	Other mercantile	6,500	9,500,000
<b>Fireworks</b>			Public	25,700	46,600,000
<b>Exposure</b>	2,000	1,000,000	Restaurants, taverns	31,500	97,500,000
<b>Explosions, miscellaneous and unclassified</b>	29,700	33,100,000	Schools and colleges	15,600	25,300,000
<b>Miscellaneous known causes</b>	32,800	48,200,000	Churches	4,300	23,400,000
<b>Unknown or undetermined</b>	51,900	343,800,000	Amusement, recreation, halls, theatres, etc.	2,100	14,700,000
			Other public	2,000	12,600,000
			Institutional (hospitals, home for aged, etc.)	5,900	20,900,000
			Miscellaneous	2,600	3,600,000
				21,600	85,600,000

Source: Approximations of National Fire Protection Association.

\* In addition to the building fires there were the following nonbuilding fires (excluding brush, rubbish, and grass fires): 103,400 forest fires with \$175,100,000 loss, 160 aircraft fires with \$125,000,000 loss, 229,500 motor-vehicle fires with \$22,500,000 loss, and 21,300 miscellaneous fires (including ship fires) with \$77,500,000 loss. Totals for building and nonbuilding fires were 1,245,160 fires with \$1,544,200,000 loss.

FIGURE 16.3. Estimated Losses in Building Fires by Cause and Occupancies, 1960.

needless and untold panic, grief, and destruction. Losses incurred from some 57,000 fires each year exceed 21 million dollars. The rubbish carelessly stored carries an expensive price tag.

In addition to the known causes of fires discussed in these past few pages, there are other types of fires that merit considerable attention. While not too frequent, fireworks, gases, explosions, and exposure leave a formidable path of destruction across the nation each year. These are fires that can be dramatic in their impact on a community when they occur. A gas explosion or a home destroyed by fireworks can cause many persons to suffer needless loss of life or property damage. Because these types of incendiary conditions do not occur in large numbers, people should not be led into believing that they never happen. In a recent edition of *Accident Facts*, it was pointed out that there are 45,000 fireworks, explosive gas, and explosion types of fires each year, causing 76 million dollars worth of property damage. Yes, these are fires that need to be considered in a serious vein by the homemaker, businessman, or industrialist alike. Proper education and preventative measures may save a lovely home or great factory—or a life.

School personnel, homemakers, and business executives should not become indifferent and discount fire as a threat to personal life or property. It should be kept in mind that fires occur in all types of structures.

OCCUPANCY	NUMBER
Residential (Dwellings, apartments, hotels, trailers)	610,000
Storage (Barns, Grain Elevators, Lumberyards, Garages)	127,000
Industrial (Food, Wood, Metal and Textile Products)	48,100
Mercantile and Office (Stores, Offices, Services)	5,800
Public (Schools and Colleges, Restaurants and Taverns, Churches, Amusement Halls)	34,100
Institutional (Hospitals, Homes for Aged)	2,300

FIGURE 16:2. Places of Occupancy Where Fires Happen Each Year.

Figure 16:2 depicts the various places of occupancy where fires happen each year. It is evident from this figure that fires do occur in all types of buildings that are lived in, inhabited, or utilized in some fashion by people. In short, these cover all walks of life and all aspects of living or work pursuits. Fire is, without question, a serious threat to life and property each day.

tinguishment of various kinds of fires. It seems that, no matter how hard people and agencies work on the prevention of fires, there will continue to be a certain number each year. Therefore, it is imperative that all persons know how to combat fires of all types.

**PRINCIPLES OF EXTINGUISHMENT.** Knowing how to "fight" an incendiary



FIGURE 16:4. For small fires at home or for auto use a dry chemical fire extinguisher.

(Courtesy Ansul Chemical Company)

## CLASSES OF FIRES AND EXTINGUISHMENT

When a fire breaks out, means should be taken immediately to extinguish it. It is necessary, however, to have a basic understanding of the various classes of fires before the proper method of extinguishment can be applied. It is entirely possible that a person might actually assist in the spreading of a fire or in killing himself by using an improper substance while attempting to put out the fire. For example, water would be an improper substance to use in trying to extinguish an electrical fire.

### CLASSES OF FIRES

The most satisfactory method of extinguishing a fire depends primarily upon the type of material or substance which is burning. For this purpose, fires are generally divided into the following three classifications:

**CLASS A FIRES.** Class A fires occur in carbonaceous materials. These are for the most part ordinary combustibles such as wood, paper, textiles, and rubbish. Without a doubt, these are the most common and familiar types of fires experienced by the nation every day.

**CLASS B FIRES.** Class B fires involve flammable liquids. Oils, greases, and gasoline are among the more common substances included in everyday use. Each of these possess qualities of rapid burning and, consequently, spread very quickly. It is, therefore, evident that a fire of this type can be of a very serious nature.

**CLASS C FIRES.** Class C fires are ones involving electrical equipment. In industries and other business concerns that operate heavy equipment, these are of prime importance. Such fires are also possible in the home where electric fans, mixers, ranges, and the like are in daily use. It should be understood that Class C fires become Class A fires when electricity is disconnected. The homemaker needs to be aware of such hazards and be prepared to cope with them when necessary.

### EXTINGUISHING FIRES

Ideally, fires should be controlled through use of noncombustibles for construction, proper treatment of materials used for decorative purposes, separation of building areas with barriers and control of all openings in the roof, and other means that might create a draft. However, it is necessary for the individual to know and understand factors involved in the ex-

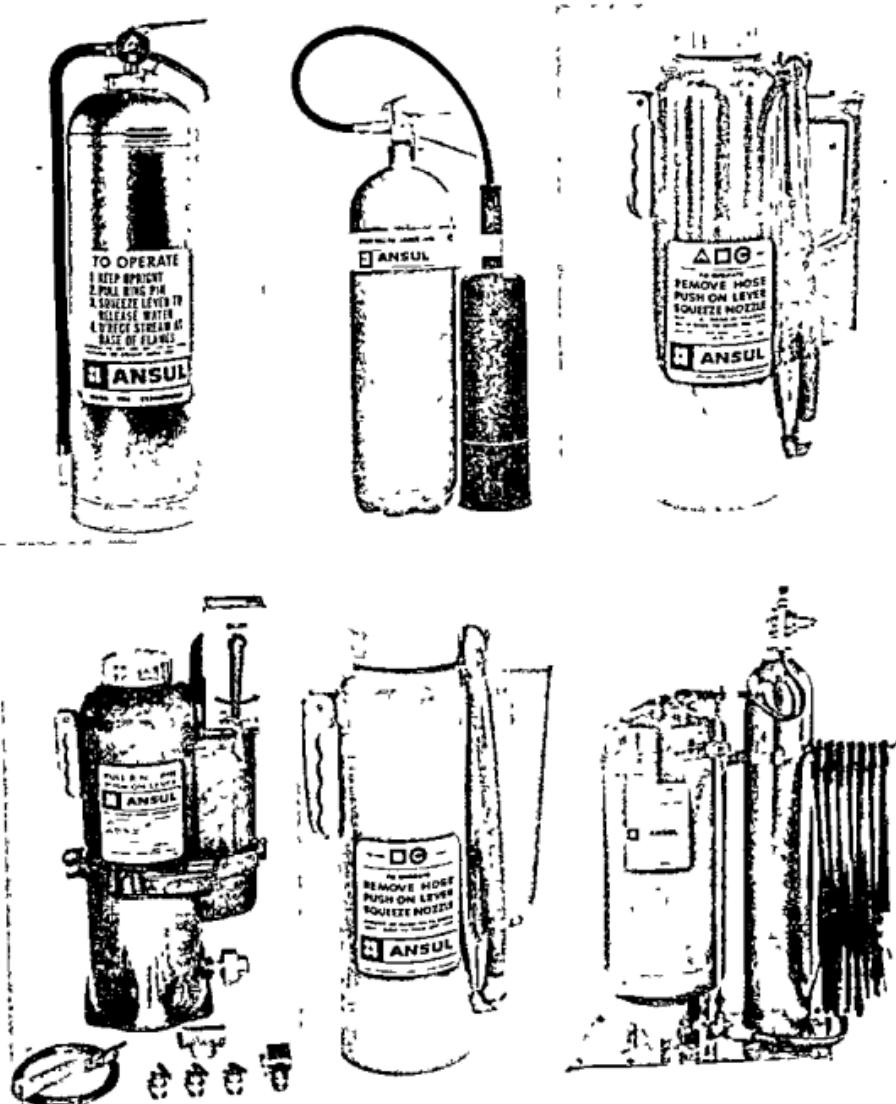


FIGURE 16:5. There is a proper extinguisher for each type of fire. Various types of extinguishers are shown above as follows: (Top left) water, (Top center) CO<sub>2</sub>, (Top right) dry chemical to be used on all classes of fires, (Bottom) three types of dry chemical extinguishers to be used on special types of fires.

(Courtesy Ansul Chemical Company)

condition requires a knowledge of the principles of extinguishment, including the various types of fire extinguishers. The following are principles related to the fire triangle, Figure 16:1. Essentially, the removal of either the heat, fuel, or oxygen from a fire is the basis of the fire extinguishment principle.

1. **Cooling.** In this instance sufficient heat is removed from the burning material so that it is cooled below its ignition temperature. Normally, the material is cooled by use of water or water-containing chemicals. Also, if fuel is removed, this assists in the cooling process.
2. **Smothering.** This involves the cutting off of the oxygen supply from a burning substance. Since oxygen is necessary to the existence of a fire, in a sense we smother the life out of the fire. In general, the fire is covered with some material that will not burn—a foam or vaporizing liquid.
3. **Cooling and Smothering Combined.** With certain materials it is necessary to cool them and at the same time attempt to cut off the oxygen supply. By doing so, extinguishment takes place at a much faster pace.
4. **Special Methods.** There are some special methods that are employed in forest fires. Methods such as back firing and fire breaks are utilized by forest fire fighting units.

**TYPES OF FIRE EXTINGUISHERS.** The National Board of Fire Underwriters (NBFU) is the authority that tests and establishes standards of fire extinguishers. The Underwriters' Laboratories (UL) is an agency established and supported by manufacturers and insurance companies under the auspices of the NBFU. Throughout the years the UL label has become a symbol of quality and efficiency in extinguishing equipment. One of the functions of UL is that of testing and approving all types of electrical and fire-fighting equipment. Therefore, all such equipment should have this label of approval.

Fire extinguishers have been developed for each of the types of fires discussed previously. The common types of fire extinguishers and the class of fire on which they may be used are:

1. **Pump Tank.** This contains either water or a calcium chloride water solution and is used on Class A fires only. It is usually made of copper or brass with either an approximate 2½ or 5 gallon capacity. Pressure is created inside the tank by use of a hand pump. The maximum horizontal range of this extinguisher is 30 to 40 feet.
2. **Soda Acid.** This type of extinguisher contains a soda-acid water solution that is expelled by reaction of sulfuric acid and sodium bicarbonate.

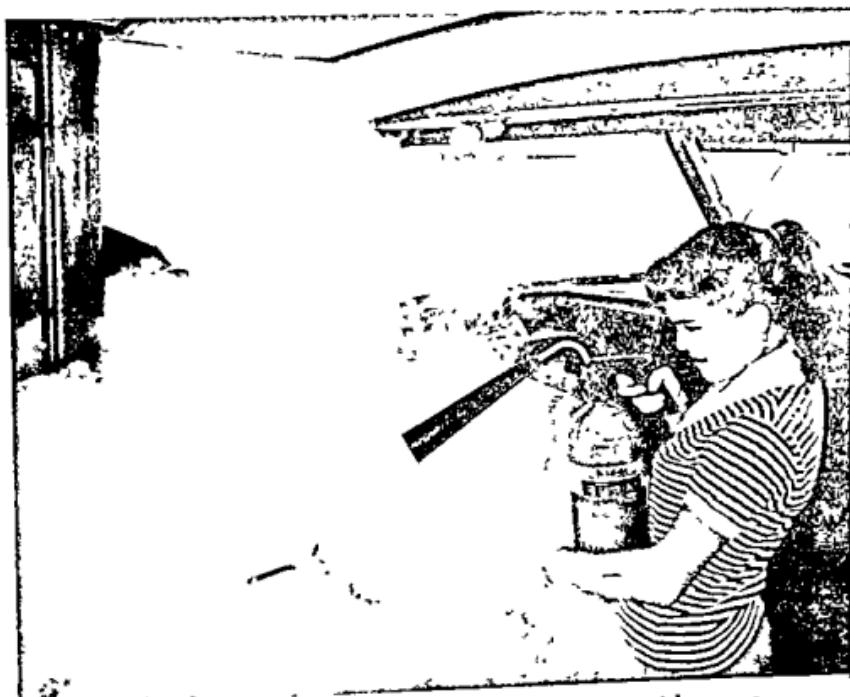


FIGURE 16:7. Using proper method and extinguisher on a small fuel fire.  
(Courtesy Walter Kidde & Company, Inc.)

6. Vaporizing Liquid. A solution of carbon tetrachloride and chlorobromomethane is expelled by pump pressure from this type extinguisher. It consists of a brass or copper cylindrical tank with a capacity of about one quart. This extinguisher is used primarily on Class B and C fires with a range of 18 to 30 feet. The solution in this extinguisher is very dangerous and care should be exercised when using it.
7. Dry Chemical. The contents are treated sodium bicarbonate which depends upon a small cartridge of carbon dioxide to expel the dry chemical. It operates through pressure on a trigger. The discharge will last approximately 15 to 30 seconds. It is especially effective on Class C fires. A 5-pound extinguisher of this type has a range of 10 to 12 feet while the 20- and 30-pound models have an effective range of 20 to 25 feet.

It is entirely possible to use extinguishers on other types of fires than those specifically mentioned above. However, decreased efficiency results,

nate. To operate it one needs but to invert the tank. It has an approximate  $2\frac{1}{2}$  gallon capacity and a range of 30 to 40 feet. It is used primarily on Class A fires but can be utilized to a limited extent on Class B fires, e.g., vehicle engines.

3. **Gas Cartridge.** This is outwardly the same as the soda-acid type, but it uses plain water or an antifreeze solution. To operate it, one must invert the tank and bump it hard on the ground. This drives a pin into the cartridge, releases the gas, and prepares it for use. This extinguisher is to be used only on Class A fires, holds about  $2\frac{1}{2}$  gallons of water, and has a range of 30 to 40 feet.
4. **Foam.** The foam extinguisher contains aluminum sulfate in addition to soda, water, and a foam stabilizing agent. A  $2\frac{1}{2}$  gallon extinguisher is capable of generating about 20 gallons of foam with a range of 30 to 40 feet. This type is effective against both Class A and B fires. To operate it, simply invert.
5. **Carbon Dioxide.** This extinguisher contains carbon dioxide under pressure. The contents are expelled through a hornlike nozzle by opening a valve, and has a range of only 3 to 8 feet. This might be considered an all-purpose extinguisher but it is most effective on Class B and C fires.



FIGURE 16.6. A carbon dioxide extinguisher being used on a small liquid fire.

(Courtesy Walter Kidde & Company, Inc.)

## THE HUMAN ELEMENT

There was a time when fires were made "the hard way." Prehistoric man had to struggle with his flints, shavings, or pair of "fire sticks." Today this is certainly not the picture, for modern society of the 20th century thinks very little about fire and its devastating force. People of today are so unconcerned about the potential of fire that they are careless and negligent in their use of its power.

As previously pointed out, the careless handling of matches and smoking, plus misuse of electricity, accounts for nearly 40 per cent of all fires of known origin. This points to the fact that fires are caused by individuals. Thoughtless acts, such as tossing away a lighted match, cigarette, or allowing rubbish to pile up in a corner of the school, have caused many heartaches to countless families. Allowing wiring to become faulty, using flammable liquids without observing proper safety practices, and the over-loading of circuits are but a few examples of the careless ways that fathers, mothers, school personnel, and industrial employees flagrantly violate safe practices which control the powers of fire. How many of the following major school fires were caused by human carelessness?

1908	Collingwood, Ohio	175 lives
1915	Peabody, Massachusetts	22 lives
1923	Camden, South Carolina	77 lives
1924	Babbs Switch, Oklahoma	36 lives
1954	Cheektowaga, New York	15 lives
1958	Chicago, Illinois	95 lives

No doubt a number of the above fires were caused by negligent human beings. A review of Figure 16:8 should also motivate people to wonder how many of these major fire disasters are the result of individual thoughtlessness. Whether in school, home, public places, the forest, or the great factory, human error and faulty judgment are the primary factors causing fires. Therefore, the major objective in the preventing of fires is reduction of these factors to a minimum. This is the challenge to be met in the elimination of needless fires that take thousands of lives and cause millions of dollars worth of property damage each year.

## SAFE PRACTICES IN FIRE PREVENTION AND PROTECTION

In the preface to the Coronor's Jury report on the 1958 Chicago School Fire, the statement is made that proper fire protection is not a luxury, it is

and in some cases the extinguishers are generally ineffective. Therefore, it is best to use the extinguisher proven most effective for a particular type of fire.

**CARE AND USE OF EXTINGUISHERS.** Extinguishers are a valuable means of protecting a home, school, or industrial establishment against serious loss in case of fire. They are also useful in keeping fires under control so they do not spread. It should be emphasized, however, that the right kind of extinguisher must be utilized in coping with various types of fires. Also, it is necessary for the proper types to be placed where they can be reached easily. For best results in the use of fire extinguishers, the following should be considered:

1. All extinguishers should be inspected on a periodic basis. The weighing of extinguishers is a common method of determining whether or not refilling is necessary. Any maintenance needed should be taken care of immediately, refilling as directed.
2. The type and location of all extinguishers should be periodically evaluated and reviewed in light of changing uses and space.
3. Special care must be exercised with fires involving electrical equipment when extinguishers containing water are employed. Water is a conductor of electricity, and it is possible for a person to be electrocuted. Care must also be exercised when using dry chemical extinguishers. A great amount of damage can result if the chemical is allowed to get into delicate electrical equipment.

**AUTOMATIC DETECTION AND SPRINKLER SYSTEMS.** Through the years, automatic detection and sprinkler systems have proven to be the best means of fire control yet devised. These are systems designed to operate automatically when certain atmospheric conditions are reached. They "find" and commence control of the fire before it is discovered by human senses. Smoke detection units seek out the first signs of fire by constant and automatic analysis of air samples. If a sample contains smoke, it is recorded on a photoelectric cell, and this causes the alarm to sound. An automatic sprinkler unit begins to operate when room temperature reaches certain levels. Sprinkler heads used in such systems are available in several temperature ratings to accommodate different hazard and ambient temperature conditions. Regardless of the type of system used, it should be equipped with a waterflow alarm. This device sounds the alarm to let people know that water is flowing through a portion of the system. It seems best that a combination system of smoke detection and sprinkler be utilized to assure the most complete protection possible to the school, church, home, or industrial plant.

## SAFE FIRE PRACTICES

## ELECTRICITY

1. Be certain that your fuses are of the right amperage for your circuits.
2. Do not overload circuits.
3. Employ only competent electricians to install or repair wiring.
4. Purchase electrical cords and appliances that have the U.L. label of approval.
5. Have all new electrical installations, such as air conditioners, made by a qualified electrician.
6. Do not string wires over nails or hooks, or under carpets. Exposed areas are subject to wear, therefore creating a hazard.

## BASEMENT

1. Have heating units, chimneys and flues inspected and cleaned annually.
2. Do not attempt to repair heating units unless qualified.
3. Do not permit rubbish to accumulate and lie close in such units.
4. Never leave paints, turpentine or other such materials near the furnace.
5. Provide a metal container for ashes.
6. Install additional insulation on walls and ceilings near heating units.
7. Never use matches if you suspect a gas leak.

## BEDROOM

1. Never smoke in bed.
2. Sleep with bedroom door closed.
3. Turn out portable heaters before going to bed.
4. Never string extension cords around the bedroom.

## KITCHEN

1. Keep stoves clean—avoid accumulation of grease and keep grease

containers away from the stove.

2. Keep a gas range clean and make certain that curtains or paper towels do not blow over the flame.
3. Never keep flammable liquids in the kitchen.
4. Never clean with gasoline.
5. Exercise special care when using an oil or kerosene stove. Refill tanks outside if possible. Keep the stove clean and keep it stable so it will not tip over.
6. Maintain adequate clearance between the wall and a wood or coal stove.

## MATCHES—SMOKING

1. Always have ashtrays handy, and use them.
2. Never smoke in bed.
3. Never discard a lighted match.
4. Keep matches out of the reach of small children.
5. Make certain that all cigarettes and cigars are out before emptying ash trays.
6. Inspect the premises to determine if all matches and cigarettes are out before leaving the house.
7. Never strike a match in a closed area such as a closet or attic where combustibles are kept.

## LIVING ROOM

1. Never attempt to repair the family television set.
2. Install a lightning arrestor since high television aerials may increase the danger of lightning.
3. Maintain an air space under the television set to dispel the heat it releases.
4. Dispose of and handle matches and cigarettes with care.

FIGURE 16:9. Safe Fire Practices.

<i>Major Fire Disasters</i>	<i>Death</i>
Peshtigo (Wisc.) and surrounding area forest fire	Oct. 9, 1871 1,152
City of Chicago	Oct. 9, 1871 250
North German Lloyd Steamships, Hoboken, New Jersey	June 30, 1900 326
Rhoades Opera House, Boyertown, Pennsylvania	Jan. 12, 1903 170
Iroquois Theatre, Chicago	Dec. 30, 1903 575
Triangle Shirt Waist Company, (New York)	Mar. 25, 1911 145
Cloquet (Minn.) and surrounding area forest fire	Oct. 12, 1918 282
Cleveland Clinic	May 15, 1929 125
Ohio Penitentiary, Columbus	Apr. 21, 1940 320
Dance Hall, Natchez, Mississippi	Apr. 23, 1940 208
Boston Night Club	Nov. 28, 1942 492
Hartford (Conn.) Circus	July 6, 1944 168
Atlanta Hotel	Dec. 7, 1946 119

FIGURE 16:8. Major Fire Disasters.

(Courtesy National Safety Council)

a necessity. Certainly this is recognized as being applicable to schools, homes, public places, office buildings, industrial establishments, and businesses alike. Since fire strikes all of these places, it is essential that safe practices in fire protection be the rule the year around. The National Academy of Sciences-National Research Council reports that "studies in behavior show that knowledge and training are essential in 'right' responses. Many fire disasters could have been avoided had people been informed of the consequences of ill-considered behavior and had they been ready and willing to assume proper responsibilities."<sup>6</sup>

It seems that everybody talks about fire prevention, but the question is, what are they doing to help? Figure 16:9 depicts the best known safe practices applicable to places where fire disasters strike each day.

### ESCAPE PLAN

All homes are subject to fires; therefore, each must be prepared with a basic plan of action in case such an emergency does develop. When fire strikes, if at all possible, immediately (1) get everyone out of the house, and (2) call the fire department. However, if this is not possible and the family is caught, then a plan of escape must be put into operation. This should be a well-designed plan, understood by all members of the family. The following escape rules have as their basis (1) knowing all possible

<sup>6</sup> *Ibid.*, p. 14.

cedures involved which in view of their being cooperatively formulated, are more likely to be accepted at all levels. Planning for fire safety must be all-inclusive."<sup>7</sup> The fundamental approach for planning fire safety in the school follows three avenues; namely, prevention, escape, and control. Such planning takes into consideration all facets of the fire safety program.

## CONSTRUCTION

Fire safety should be considered from the moment school authorities decide to construct a new facility. The selection of a site, the building layout, and design are essential to the protection of students at all levels of instruction. However, no single building design best suits education, fire safety, property protection, and all other school needs. Basically, it is a matter of applying the following principles:

1. Select a site with due regard for fire safety.
2. Use fire resistive materials in all phases of construction.
3. Separate or isolate high-hazard areas.
4. Maintain exits, passageways, windows and stairwells at accepted fire code standards.
5. Develop fire and smoke barriers as an integral part of all new construction.
6. Insure suitable placement of alarms and alarm stations.
7. Do not practice economy in construction if it is at the expense of fire safety.
8. Use space occupancy formulas in determining space needs.

**MAINTENANCE AND OPERATION.** An adequate maintenance and safe-operating program is essential if fire hazards are to be kept at a minimum. This is a planned program with a regular schedule of activities to assure the elimination of all fire hazards.

**HOUSEKEEPING.** Nothing is more important than a good housekeeping procedure within a school system. Many items that may be useful at some later date tend to accumulate. However, good housekeeping practices should be in force at all times. The following are considered as essential, good housekeeping practices:

1. Collect and dispose of all debris and trash daily.
2. Inspect the school premises daily to discover and eliminate any poor housekeeping practices.

<sup>7</sup> C. F. Carroll, "Fire Safety Through Sound Planning," *The Bulletin* (Washington: National Association of Secondary-School Principals, 1960).

## SAFE FIRE PRACTICES (cont.)

## ATTIC

1. Keep the attic clean at all times.
2. Never allow old clothes, toys, furniture, and paper to accumulate.
3. Never store a highly volatile liquid of any type in the attic.

## CARAGE

1. Remove all oil drippings promptly.
2. Observe the "No Smoking" rule in the garage at all times.
3. Cover paint tightly and store away from any heating units.
4. Store gasoline in approved safety cans.

## SEASONAL FIRE HAZARDS

1. Always use a wire-mesh or metal container when burning leaves or trash.
2. Never start a fire outside on a windy day.
3. Never start a fire near a building or fence.
4. Prevent children from playing with bonfires or other open fires.
5. Never leave an outdoor fire unattended.
6. Do not leave an outdoor fire until ashes are cool enough to test with your hands.

FIGURE 16:9. Safe Fire Practices (cont.)

escape routes, and (2) the ability to be calm and avoid panic. Escape rules recommended to be followed by all families are:

1. Stay close to the floor (less heat—more oxygen).
2. Take short breaths and cover face with wet cloth.
3. Never leave doors or windows open. Open doors and windows help to spread the flame.
4. Keep out excessive heat and smoke. Feel doors—if hot, do not open.
5. Determine an outside meeting place. Count noses—is everyone out?
6. Never re-enter a burning home unless absolutely certain that it is safe to do so.

The family should be prepared and the only way is through pre-planning and devising a fire escape plan.

## SCHOOL

The need for well-designed and executed programs of fire prevention and protection in the school is obvious. Mr. Charles F. Carroll, Superintendent of Public Instruction, State of North Carolina, stated recently that "... sound planning for fire safety depends, to a great degree, upon three kinds of planning: educational, psychological and technological.... As all facets of fire safety are considered—construction, maintenance, attitudes, prevention, evacuation, and the human element—policies and pro-

vices available today. "Fire-proof" buildings tend to lull individuals into a state of unconcern. Indeed, the human element is important in fire safety.

**COLLEGES AND UNIVERSITIES.** When discussing fire safety as it relates to school, it should be understood that this includes colleges and universities. Until recently, however, the fire problem on the approximate 1,950 campuses has been overlooked or thought of as being nonexistent. By 1965 there will be some 6 million students enrolled in our colleges and universities: the projected figure for 1975 is approximately 9 million. Surely those who are responsible for the safety of so many young adults should deem it necessary to develop fire prevention and protection programs comparable to those on the elementary and secondary school levels. For detailed information related to fire safety on the college and university campus, contact the Campus Safety Association of the National Safety Council, and also refer to Chapter 18 on Adult and Higher Education.

#### PUBLIC PLACES

Many national fire disasters have occurred in public places. The Iroquois Theatre, Natchez dance hall, Boston night club, and Atlanta hotel fires are examples of the variety of public places where fire has taken 100 or more lives in a matter of minutes. As with the schools, an over-all plan of fire prevention and protection must be developed to assure the safety of all occupants of public buildings. Construction features, exits, and an alarm system are the basic features of this type program. Without question, these must conform to accepted standards. The National Fire Protection Association states that it "has no record of loss of life by panic or by trapping in a burning building in any case where the requirements of the Building Code were met."<sup>8</sup> Certainly this is evidence enough to require all local buildings used by the general public to bring their local building codes and ordinances in line with the above-mentioned code of the NFPA.

#### REPORTING FIRES

The importance of knowing the correct procedure of reporting fires cannot be overemphasized. It is necessary that some preconceived plan be developed and taught to school children and to the workers in business

<sup>8</sup> National Fire Protection Association, *Convention Report* (Boston: The Association, 1961).

3. Plan adequate storage space for the entire school staff—administrators, teachers, custodians.
4. Insist that good housekeeping be practiced by all in the school.

**INSPECTION AND PREVENTION.** Periodic inspections of the school premises should be made to ensure the safeness of the building at all times. Daily inspections should be made by the custodial staff and principals, while more intensive inspections should be made on a monthly basis by a "team" composed of the fire marshall, building engineer, head custodian, insurance representative, administrative and teaching staff. Obviously, some hazards discovered will need immediate attention, while others may be placed on the annual building repair list.

**DRILLS AND EVACUATION.** A fire drill is a very important school exercise. This type of experience enables students to participate in the safe and orderly evacuation of a school building. It also sets a pattern of action and educates students to meet emergency situations involving fire and panic with which all of us may be faced in daily life. For fire drills to be effective, they must be realistic and militaristic; they must be impressive and not routine.

It is essential that a total fire drill and evacuation plan be developed for each school building. Such plans should be known and understood by the school staff and students alike. Directions explaining and depicting escape routes should be conspicuously displayed in every room of the building. This includes special areas such as school auditoriums, cafeterias, and gymnasiums.

Also essential to the development of an adequate fire-drill program is the providing of two alarm systems. One of the systems operates electrically off the routine bell system of the school. The other system is an auxiliary one that is mechanically operated. This could be a siren, bell, or the like, anything that can be utilized in case of a power failure.

**HUMAN BEHAVIOR AND ERROR.** "In all our planning, consideration must be given to the possibility of human error because too often the human element proves to be the weakest link in the chain." The attitude that the teacher, student and staff may have toward this type of program will significantly influence its success or failure. One of the greatest dangers is the acceptance, by school people, of minimum planning and program standards as sufficient to obtain maximum safety. Complacent administrators, indifferent teachers and custodians certainly prohibit the development and acceptance of a sound program of fire safety in the school. False security may also be created by various types of automatic detection de-

vices available today. "Fire-proof" buildings tend to lull individuals into a state of unconcern. Indeed, the human element is important in fire safety.

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and techniques have been devised to help construct sound fire prevention programs. Fires rarely break out where basic principles of prevention are applied. Certainly the application of such principles should be a challenge to homemakers, school personnel, business and industry officials alike.

The home, where fond memories are established by family ties, can become a raging inferno if family members are negligent. Schools have never been immune to the ravages of fire. Sound programs of fire prevention should be in force at all business establishments and industrial plants.

The National Fire Protection Association estimates that the following toll is taken by fire daily: 31 lives, 1,525 homes, 203 farm properties, 189 stores, 105 factories, 22 official buildings, 11 schools, 11 churches, and 4 hospitals. This toll should serve as a challenge for every American to be more dedicated to fire prevention and protection.

## ACTIVITIES

1. Develop a demonstration illustrating the three classes of fires for presentation to the class.
2. Organize a fire alarm and evacuation program for a senior high school of 1,000 students.
3. Write a research paper on the history of school fires. Attempt to identify major school fires that have occurred in recent years.
4. Develop a large classroom poster depicting the various fire hazards commonly found in the home.
5. Visit a building on your campus for the purpose of investigating the various fire hazards. Report your observations to the class.
6. With three other students organize a class panel discussion on the topic, "Causes of Building Fires."

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CLAUDY, WILLIAM D., *Respiratory Hazards of the Fire Service*. Boston: National Fire Protection Association, 1957.

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Federation of Mutual Fire Insurance Companies, *Is Your Student Housing Fire Safe*. Chicago: The Federation, 1960.

and industry alike. The following are several factors that must be considered in the proper reporting of a fire.

The prompt reporting of a fire is essential. It is a known fact that the first few minutes after the fire has been detected are the most important in bringing a fire under control. After the first six minutes, the odds against gaining quick control multiply rapidly. The chances of saving a structure are much greater when a fire is reported promptly.

Information necessary for the reporting of a fire should be brief, accurate, and stated in a clear voice. Essential information in making a report is (1) name, (2) address, (3) street name, (4) location of building on block, (5) special landmarks, (6) special street arrangement (e.g., one-way) and (7) most direct route to the building.

In every community the phone number of the fire department is common information. This number appears in all phone books and in materials published by local governments. It is best for adults to call the fire department directly. For small children, it is best to teach them to dial "0" and say, "*I want to report a fire.*"

When a phone is not available, the fire must be reported through an alarm box located in or outside the building. The locations of all such boxes should be known to all students and workers. A fire alarm may be sounded by pulling the activator lever or by breaking the glass front, then stimulating the alarm.

The most prudent course to take when a fire breaks out is to evacuate the building. However, the importance of reporting the fire as early as possible cannot be overemphasized. Immediate control is necessary if major damage is to be avoided. Moreover, early reporting is important to the protection of adjacent buildings.

## SUMMARY

The annual toll of death and destruction levied by fires across the nation is a toll of which the United States cannot be proud. The extent of fire deaths, property losses and damage has in recent years grown to astronomical proportions. Fire that can be such a fine servant of man causes much suffering and grief to the general public. However, a large proportion of the misuse of fire is due to man's own carelessness. Man, many times each year, does not utilize the power potential of fire in a wise and efficient manner.

Most fire causes are known by accident prevention specialists. Methods

## Disaster Preparedness

THROUGHOUT HISTORY, disasters have plagued mankind. With all of the advance in the physical, natural, and social sciences, humanity has not been able to devise a calendar or clock which would enable people to predict a date and time when a disaster will strike the home, family, or community. Disasters resist an organized pattern of occurrence, thus making it difficult to establish causal models to be used in predicting such happenings.

A careful review of national disaster occurrences reveals that disasters are not selective. Today, calamitous events such as tornadoes, floods, fires, hurricanes, explosions, and earthquakes can wreak havoc in any community, large or small. The destructive powers of Mother Nature are certainly among the most forceful known to produce death and damage across the United States each year.

In addition to the natural and man-made disasters mentioned above, man has in recent years created a calculated disaster which is perhaps the most deadly of them all—the nuclear bomb. Without question, there is enough power in any one of the various types of nuclear bombs now stocked to destroy the largest city in the world and cause considerable damage for miles around. Moreover, the atomic fallout perimeter is such that radioactive materials would make living in adjacent areas an impossible task for many days.

The National Safety Council reports that disasters are generally front-page news even though the total number of lives lost are relatively few compared to the day-by-day life losses from ordinary accidents. In general, disasters are not recorded as such unless there has been a loss of 100 lives or more. However, the loss of one life in any of the previously discussed phenomena is in fact a disaster. A disaster is technically defined as any sudden, unforeseen emergency such as tornado, flood, fire, riot,

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need it again. Civil Defense is an obligation of every person in the United States."<sup>2</sup>

Each community and every individual have a role to play in disaster preparedness. The following represent basic principles for individual action in an emergency:

1. Survival depends upon an immediate response to procedures that have been learned. It depends upon how well individuals know what to do in an emergency.
2. The survival of others depends upon the wisdom of your reaction to an emergency.
3. Emotional security depends upon facts, understanding, sound action, and basic training carried out realistically.
4. Self-reliance can reduce confusion and casualties.
5. It is normal to be afraid, but excessive and irrational behavior leads to mass hysteria.
6. All have a responsibility, within the limits of their powers and ability, to aid in the disaster preparedness program.
7. In learning to defend yourself and your way of life, you are preparing for a future of security, happiness, and better living.

With respect to the consequences of an atomic attack, the Federal Civil Defense Administration states that "our preparations to survive an attack are more important than our guesses as to its probability. . . . The time is past when we can assume that mutual destruction will not be undertaken. Failure to prepare for it is to invite it. . . . The consequence is plain. The one who has an effective civil defense will have much hope of victory. . . . That is why no responsible government at any level anywhere in the United States can afford to neglect civil defense."<sup>3</sup> The above is certainly applicable to natural disasters as well.

#### TYPES OF DISASTERS

Today there are many different types of disasters that threaten mankind. In general, all disasters can be classified as either military, natural, or man-made. The following is a discussion of each of these major types, along with a description of the various kinds of mishaps that are possible in each area.

<sup>2</sup> Federal Civil Defense Administration, *The States, Counties, Cities and Civil Defense* (Washington: The Administration, 1955), p. 3.

<sup>3</sup> *Ibid.*, p. 3.

*hurricane, earthquake, or explosion which will or may cause personal injury, loss of life and/or property damage, including an act of war.*

The most devastating disaster on record is the Galveston tidal wave of Sept. 8, 1900. In this major catastrophe some 6,000 lives were lost. There are many other notable disasters which are well remembered by citizens throughout the nation. Refer to Figure 17:1 for a list of some of our nation's major disasters.

## DISASTER PREPAREDNESS DEFINED

What is disaster preparedness? This is the pointed question that is being asked of local, state, and national authorities. In general, disaster preparedness is a way of saving lives and property—protecting the individual and his family in case of natural cataclysm or war; an extended form of self insurance. If these statements are to have a moral connotation, they might read: if preparations are not made to protect self and family, a local preparedness unit cannot guarantee 100 per cent safety.

Mr. R. L. Booker, Chairman of the National Education Association Credentials Committee, reported recently that "disaster preparedness isn't something which can be wrapped up in a package marked 'open in time of need.' It is a continuing program."<sup>1</sup> A disaster preparedness program involves the entire community on a day-to-day basis. *Disaster preparedness can be defined as planned and organized action to survive disasters produced by natural causes or by military attack.* It is obvious that preparedness is one of the most personal things in the world today.

The known potential dangers possible through natural or man-made causes are sufficient to necessitate disaster planning by individuals plus the organization of local preparedness units. It behooves everyone to be conscious of this need and introduce plans for action on the part of the family, school, or community. Every city is a target for man-contrived attacks or for the angry hand of Mother Nature on the rampage.

As previously stated, disaster preparedness is essentially an insurance policy. It begins within the minds of individuals and terminates with the protection of a nation. The Office of Civil Defense and Mobilization states that it is "like making a suit of clothes for a man you have never seen, or like a parachute—if it is not ready the first time, you probably will not

<sup>1</sup> R. L. Booker, "Disasters You Hope Will Never Come," *National Education Association Journal*, Oct. 1960, p. 16.

**Others:**

San Francisco earthquake and fire	Apr. 18, 1906	452
Long Beach (Calif.) earthquake	Mar. 10, 1933	120
New London (Texas) school explosion	Mar. 18, 1937	294
Port Chicago (Calif.) ship explosion	July 18, 1944	322
Cleveland gas tank explosion	Oct. 20, 1944	130
Texas City (Texas) ship explosion	Apr. 16, 1947	550
Two-plane collision over Grand Canyon, Arizona	June 30, 1956	128
Two-plane collision over New York City	Dec. 16, 1960	134

Source: National Almanac, World Almanac, National Fire Protection Assn., Chicago Historical Society, Texas Inspection Bureau, American Red Cross, city and state boards of health, and the Metropolitan Life Insurance Company.

FIGURE 17:1. Major Disasters in the United States 1871-1960. (cont.)

(Courtesy National Safety Council)

### MILITARY ATTACK

During recent years the American people have become aware of the fact that the United States is vulnerable to the attacks of potential enemies. This change in attitude has come about due to the realization that aggressor nations have made great progress in the development of intercontinental bombers, nuclear weapons, and guided missiles. It is generally conceded that in an all-out attack, every major city and nearly all states would be exposed to certain deleterious effects in some way. These frightening prospects are less grim when it is understood that the nation is capable of repressing an attack and of recovering from one in an efficient manner, whether the damage is great or small. Moreover, the prospects of attack are minimized when the enemy forces know that adequate preparations have been made and that the efficiency of such a program is maintained at a high level of performance.

Yearly, continuous re-evaluation of enemy capabilities are made from official intelligence reports, and subsequent necessary adjustments are made in the official disaster preparedness program of the nation. It can be assumed that today's preparations are based on the fact that enemy weapons are predominantly nuclear and that the use of biological and chemical agents is possible. The Cuban crisis of 1962 is an example of how intelligence reports can be used for Civil Defense planning.

The atomic and hydrogen bombs are nuclear weapons that have great destructive power. These differ from conventional type bombs in that (1) they release energy that is thousands of times as great as the largest TNT bombs; (2) their explosion is accompanied by invisible radiation, intense

Disasters are front-page news even though the lives lost are relatively few when compared to the day-by-day life losses from ordinary accidents. Below are public disasters involving 100 or more U.S. residents.

		Deaths
Peshtigo (Wisc.) and surrounding area	forest fire	1,152
City of Chicago		250
North German Lloyd Steamships, Hoboken, New Jersey		326
Rhoades Opera House, Boyertown, Pennsylvania		170
Iroquois Theatre, Chicago		575
Collinwood (Ohio) School		176
Triangle Shirt Waist Co. (New York)		145
Cloquet (Minn.) and surrounding area	forest fire	283
Cleveland Clinic		125
Ohio Penitentiary, Columbus		320
Dance Hall, Natchez, Mississippi		208
Boston Night Club		492
Hartford (Conn.) Circus		168
Atlanta Hotel		119
<b>Marine:</b>		
"Sultana" exploded—Mississippi River		1,405
"General Slocum" burned—East River		1,021
"Titanic" struck iceberg—Atlantic Ocean		1,517
"Eastland" capsized—Chicago River		812
"Vestris" foundered off Virginia Capes		111
"Morro-Castle" burned—off New Jersey coast		134
U.S. Aircraft Carrier "Bennington" explosion—off R.I. coast		103
<b>Floods:</b>		
Johnstown (Pa.)		2,209
Galveston tidal wave		6,000
Ohio and Indiana		732
St. Francis (Calif.) dam burst		450
Ohio, Allegheny, Monongahela and Susquehanna Rivers		168
Ohio and Mississippi River valleys		360
Los Angeles		181
<b>Storms:</b>		
Texas Coast hurricane		375
Louisiana hurricane		500
Illinois tornado		606
Gulf Coast (Fla., Ala., Miss.) hurricane		243
Florida hurricane		1,833
Florida hurricane		409
Miss., Ala., and Ga. tornadoes		402
New England hurricane		657
Ill., Tenn., Ky., Ala., Miss., Ind., and Mo. tornadoes		138
Pa., W. Va., and Md. tornadoes		159
Oklahoma, Missouri and Arkansas tornado		119
Texas-Oklahoma tornado		167
Ark., Tenn., Mo., Miss., and Ala. tornadoes		229
Waco, Texas, tornado		114
Michigan and Ohio tornadoes		142
Kansas, Oklahoma, Texas and Missouri tornadoes		115
Northeastern States hurricane		180
Louisiana and Texas hurricane		350

FIGURE 17:1. Major Disasters in the United States 1871-1960.

7. **Fireball.** The large, swiftly expanding sphere of hot gases, producing brilliant light and intense heat, that is the first manifestation of a nuclear explosion.
8. **Ground Zero.** The surface point at or above which a nuclear weapon detonates.
9. **Kiloton.** The power of nuclear weapons is measured in equivalents of the explosive energy of TNT. A one-kiloton weapon has the explosive equivalent of 1,000 tons of TNT.
10. **Megaton.** The explosive equivalent of one million tons of TNT.
11. **Roentgen.** A unit for measuring an amount of radiation exposure.

## NATURAL DISASTERS

There are a great variety of natural disasters that may strike mankind. All such phenomena, however, can be classified in one of two categories of so-called peacetime disasters. These are (1) disasters caused by nature, and (2) disasters caused by negligent or willful acts of man. The latter shall be treated as a separate type of tragedy.

Nature is often erratic, particularly in certain parts of the nation. When some freakish acts of Mother Nature occur, widespread damage, inconvenience, and often loss of life result. Therefore, it is incumbent on all persons to be prepared at times when such emergencies are inevitable. For the most part, disaster preparedness plans can be developed to encompass both military and natural catastrophes.

**HURRICANE.** One of the most devastating forces of nature experienced by persons in this country is the storm known as a hurricane. In general, it is conceded that this is the most destructive type of storm. A hurricane in an advanced stage of development is a vast whirlwind of tremendous violence. This storm is called a hurricane in the Atlantic and a typhoon in the Pacific.

Most hurricanes originate close to the equator where the air is moist and warm. This air moves toward and around a focal point of low barometric pressure, and the winds generated move in a counterclockwise motion that simulates a spinning top. Wind velocities reach speeds greater than 100 miles per hour in certain parts of the hurricane. Technically, wind velocities must reach some 74 miles per hour before they can be classified as a hurricane. If such a condition develops in the Northern Hemisphere, it generally moves north away from the equator. When the hurricane reaches the tradewind belt, it generally travels northwest.

heat and light, and; (3) the substances that remain are radioactive and harmful to living organisms. Such weapons can be exploded in the air, at the earth's surface, under the ground or under the water. The amount of destruction, contamination and area involved depend on where the bomb explodes. Generally speaking, an air burst would produce the most widespread damage. On the other hand, a surface blast would cause less damage with fewer casualties, but the radiation danger would be increased due to the amount of earth pulled into the radioactive cloud. A subsurface blast would cause less widespread damage, but the radioactive dust or moisture would be increased. In each instance, however, survival would depend on the preparations made beforehand.

The results of the bomb dropped on Hiroshima give something of an insight into the destructive powers of the atom bomb. Most Americans have difficulty in imagining the horror of an experience resulting from the use of nuclear weapons. However, sound disaster preparedness on the part of citizens and communities is the foundation for the hope of the future on which the country must build in event of enemy attack.

It is not the intent of this chapter to give a detailed analysis of the military problem. Other sections of this chapter discuss items that are applicable to this area of concern. Listed below are a series of common civil defense terms that should be known and understood by everyone in order to follow reports and analyses released by Civil Defense authorities from time to time:

1. **A-Bomb and H-Bomb.** Popular terms for nuclear weapons. An atomic bomb explodes through fission (splitting) of atomic nuclei; a hydrogen bomb is called a thermonuclear weapon because tremendous heat is needed to start the fusion process.
2. **Blast (Shock) Wave.** The near-solid wall of air pressure produced by a nuclear explosion.
3. **Blast Wind.** The wind gust which travels with the blast wave and may be many times hurricane force.
4. **Early Fallout.** The fallout that returns to the earth the first day. The radioactivity of such fallout decreases rather rapidly at first, and more slowly as time passes.
5. **Fallout.** The radioactive debris of a nuclear explosion which eventually falls to earth in particles.
6. **Fallout Radiation.** The radiation emitted by fallout particles. Each particle of fallout gives off radiation as though it were a tiny X-ray machine.



FIGURE 17:2. The aftermath of a tornado.  
(Courtesy Ben Gelman Photo)

acteristics of a tornado funnel is that it may bounce up and down from the earth into the sky. In addition to large-scale damage, a tornado may also cause some strange things to occur. It can, for example, carry a large truck many hundreds of feet in the air; it may drive a piece of straw through a tree; it may cause a building to explode from the decreased air pressure outside it.

Contrary to the belief of many persons, tornadoes occur in every state

However, if it meets the prevailing westerly winds, it moves to the northeast. Movement of such a storm in its early stages is between 10 to 15 miles per hour, but may eventually reach speeds of 30 to 40 miles per hour. In each instance the hurricane has a well-defined eye or center where there is relative calm.

The Gulf of Mexico, Caribbean Sea, and Atlantic Ocean are the sources of practically all hurricanes that affect the United States. Most often the coastal areas between Texas and Florida, and from Florida to the New England states face the greatest threat from hurricane disaster. Damage caused by hurricanes are of three types: first, damage caused by high winds; second, flood damage caused by heavy rainfall; and third, damage caused by high tides. The amount of damage received by a community will vary according to what portion of the hurricane passed over it. The following precautions are suggested with regard to hurricanes:

1. Board up windows.
2. Turn radio on and listen to the local weather station for warnings.
3. Avoid driving if the storm is close by.
4. Stay away from shore areas or other areas that may be swept by high water.
5. Store drinking water before the storm.
6. Anchor all outdoor articles.
7. Avoid loose or broken electrical wires after the hurricane has passed.
8. Be alert for road washouts when driving after the storm.
9. Take care in starting fires. If a fire occurs, the fire department may not be able to get to the house or school.

**TORNADO.** The tornado is the most violent weather phenomenon that man experiences. In some sections of the country it is called a "twister." Tornadoes are usually caused when two contrasting (hot and cold) masses of air collide, generally at the base of a thunder cloud. The result of such conditions is a funnel-shaped cloud with upward spiraling winds of tremendous velocity. The appearance of such a storm may be in the form of a rope, elephant's trunk, or column, descending from the cloud and touching the ground. In view of the fact that conditions producing such phenomena are most often found in this country, the tornado is usually thought of as an American-patented storm.

A tornado generally moves from the southwest to the northeast at an average speed of 25 to 40 miles per hour. Normally, tornadoes last only for a short period of time, but some have been observed to travel a distance of some 300 miles before dissipating. The path width varies from around one quarter mile to some 15 to 25 miles. One of the unusual char-

as in a vast number of places along the Missouri and Ohio River basins and in the Mississippi Valley, floods continue to spell a path of destruction. Flash floods are usually a more serious threat to life than regular floods. A family may retire for the evening and be awakened by water running through the bedroom. In such cases evacuation has not been possible.

In areas that are identified as potential floodlands, care must be exercised in choosing sites for homes, schools and business establishments. With proper planning, a community can avoid the loss of lives during times when flood conditions prevail.

**EARTHQUAKES.** *An earthquake may best be described as a sudden displacement or shifting of rocks within the earth.* Fortunately, most such happenings are at shallow depths and cause little or no damage. Where great damage does occur, it is the result of the rupturing or breaking of great masses of rock far below the earth's surface. The area where the rock displacement occurs is referred to as the *seismic focus*.

Most of the earthquake activity in the United States has occurred in the Pacific Coast states and some portions of Nevada. The coastal area between San Francisco and Los Angeles seems to be the region where earthquakes happen most frequently. This is not to infer that earthquakes do not occur elsewhere in the nation. Records show that earthquakes have developed in the central states, on the eastern seaboard and even in the new state of Alaska.

Seismologists (scientists who study earthquakes) generally can identify those areas where earthquakes are most likely to occur. However, to date, it has been impossible to predict the month, week, or day when the earthquake will strike. Therefore, such happenings occur without prior warning. The most valuable protective measures against earthquakes are those taken prior to its happening. If sound construction measures are used in homes, schools, and other buildings, the possibility of extensive property loss is minimized. In addition, these safe practices should be followed:

1. Never panic. Most earthquake victims are persons who panic. Stand still and do not run outside.
2. Move close to the inside corner of the room or stand beneath the most solid overhead support in the house.
3. Remain outside, if caught there. Seldom does the earth open up and swallow human beings.

of the union. All states have experienced the devastation of such a storm at one time or another. Tornadoes generally occur in the spring and early summer; however, this is no guarantee that they will never happen during other months of the year. Records show that tornadoes have occurred every month of the year and every hour of the day. If one section of the country could be called *tornado prone*, it would be the central states. The tornado season tends to move north with the warm weather of spring. In the southern states, March and April are the months when most tornadoes occur, while in the central portion of the country, May and June bring the greatest tornado threat. It is reported that 82 per cent of the observed tornadoes have occurred between noon and midnight.

The Severe Storm Forecast Center is located in Kansas City, Missouri. It is through this center that all weather information is processed and storm warnings released. All local disaster preparedness units should have an adequate communications system so that, as information is forecast by the weather center, the community can pick up such information for the protection of the community. The general safety measures that should be taken during a tornado alert are:

1. If near a designated shelter, take cover. At home, the southwest corner of the basement is the safest place for protection.
2. In open country, move at right angles to the tornado's path. Lie in the nearest ditch or ravine if there is no time to escape.
3. At school, stay inside the building away from windows and near inside walls. Avoid auditoriums with large, poorly supported roofs.
4. In factories, make preparations to move personnel to safe places after tornado warnings have been received.
5. Seek shelter in a rigidly enforced building if caught downtown. Stay away from windows.
6. Open windows on the northeast side of the home, school, or factory.
7. Turn to the radio or television station for current information on storm conditions.
8. Keep calm.

**FLOODS.** Flood conditions can be predicted far enough in advance to allow time for evacuation; thus, few lives are lost due to floods. The severe losses incurred as a result of a flood are usually property, soil, and crop damage.

Most of the lowland areas of the nation are subject to periodic floods. In some instances the construction of levees and other flood control measures have been taken. Where adequate protection has not been provided,

isolated fire is perhaps an event that can be controlled and the damage kept to a minimum; however, a fire sweeping through a school building, factory, business district, or a forest is not easily controlled and is a disaster of the most serious order. The sad commentary related to fire causes is that man himself is most often the responsible party. The entire subject of fire prevention and protection was dealt with in depth in Chapter 16.

**SCHOOL BUS DISASTERS.** School bus disasters represent one of the most serious occurrences involving school children. This is due to the fact that a school bus accident often involves the lives of a large number of children. The most common size school bus is a 54-student-capacity vehicle. In some instances, buses are designed to accommodate up to 79 passengers, while some states allow a 20 per cent overload. It is entirely possible for one accident to involve approximately 100 students.

Most often school bus accidents arise from four basic causes: (1) collision in traffic, (2) loss of control of vehicle, (3) road conditions and weather, (4) and mechanical defects. With some 12.5 million pupils being transported in an estimated 175,000 school buses daily, the threat to the lives of such students should be the concern of every school administrator, teacher, and parent.

In order to eliminate the possibility of school bus accidents, high standards should be maintained in all phases of the operation. A detailed discussion of the school bus transportation program is given in Chapter 10.

**EXPLOSIONS.** Because explosions occur instantaneously, there is no prior warning. Therefore, such occurrences are a constant hazard to homes, schools, businesses, and factories. Moreover, in most situations a large number of lives are at stake. It is reported that explosions accompanied by fire are responsible for one tenth of the total accidental deaths among children in the 5- to 15-year age group. One of the most devastating school disasters in history was an explosion in a New London, Texas, school. In this particular disaster, which occurred in 1937, some 297 school children were killed.

The most common causes of explosions are leaky gas pipes near heating plants, hot water heaters, or cooking equipment. Due to the lack of standards in many states, gas-operated devices are installed without regard to the safety of the building's occupants.

**BOMB THREATS.** In recent years there has been a marked increase in the number of bomb threats received in schools and other public places. In addition, a similar increase has been noted on commercial airlines and in railroad stations. Many states have experienced a wave of such threats

4. Never light fires in a fireplace, furnace, or stove immediately after an earthquake. First check for a damaged chimney or gas line.

**BLIZZARDS.** This type of storm is rather common in various parts of the northern United States. A blizzard is a severe wind and snowstorm, and may include some rain or sleet, depending on the temperature. Obstructed roads, stalled traffic, and broken power and telephone lines are some of the usual results of a blizzard. One of the most tragic consequences is that persons caught in a severe blizzard are likely to freeze to death. In addition, power failure will leave many homes without heat and, therefore, place the lives of many people in jeopardy and cause extreme frostbite and physical discomfort.

Almost every winter there are reports of stranded or isolated families, school groups, or entire communities. For example, a few years ago, Oswego, New York, was buried by eight feet of snow and completely cut off from all outside assistance. Normally, blizzards do not constitute a grave threat to those that have reasonable shelter. The following are recommended for essential protection against such occurrences:

1. Be aware of weather conditions at all times.
2. Do not leave the home, school, office, or factory in the event of a surprise blizzard.
3. Provide emergency power when people are caught in schools or other buildings. This is especially important if the heat is by electricity.
4. Store blankets and food in schools and other public places. This is not always convenient, but it is highly advisable.
5. Keep a battery-operated radio in the home and school so that contact with the outside world can be maintained.

#### MAN-MADE DISASTERS

The Office of Civil Defense reports that "in addition to the threats he experiences from natural phenomena and 'Acts of God,' mankind is also exposed to the potential catastrophes of his own doing."<sup>4</sup> Man causes many thousands to die and to suffer due to negligent or willful acts that endanger the lives of others. The following is an account of the more common man-made disasters.

**FIRE.** One of the most frequent causes of man-made disaster is fire. A fire out of control is indeed a serious hazard to life and property. A single,

<sup>4</sup> Office of Civil Defense Mobilization, *Disaster Readiness in Undergraduate Education* (Battle Creek, Mich.: The Office, 1960).

other efforts. There are certain responsibilities that are the sole responsibility of the federal government and should be recognized. It should be understood, however, that in the event of an emergency the Federal Civil Defense Administration controls only employees of the federal government, other than the military.

The Federal Civil Defense Act was passed in 1950 during the Korean conflict. This act gave the responsibility for national planning to the Federal Civil Defense Administration. The U.S. Weather Bureau is responsible for the civil defense activities related to severe weather such as tornadoes. Emphasis is placed on planning since the various states choose what to do with such plans. The basic functions performed at the national level are:

1. To develop a national civil defense plan.
2. To issue information as to what people need to know and do.
3. To train, when requested, civil defense leaders.
4. To furnish states with essential equipment.
5. To stockpile supplies.
6. To warn of attack during wartime.
7. To co-ordinate interstate movement of aid.
8. To distribute the federal stockpile of attack supplies.
9. To co-ordinate the nationwide jobs of other federal agencies.
10. To keep the President and the people informed.
11. To take part in decisions concerning the emergency restoration of communications, transportation, and other essential services.

In 1961, the responsibility for the national disaster preparedness effort was transferred to the Department of Defense under the Office of Civil Defense. The basic functions of this office are essentially the same as those listed above.

#### STATE

Since federal authorities exercise no direct control over the states in matters related to disaster preparedness, it is the responsibility of the state to plan and adapt the broad policies of the FCDA to meet the needs of its own people. The fundamental purpose of the state organization is to advise and guide citizen groups and to co-ordinate local civil defense activities. The operation of the state civil defense organization should follow the federal plan where applicable. Moreover, the state should develop its organization around existing state departments, with functions being added or deleted where necessary. The governor of each state is directly

and, as a result, a number of state legislatures have been prompted to enact statutory penalties for such hoaxes. Since then, persons have been arrested, convicted, and put in jail for even jokingly saying that they have a bomb in their briefcase.

The school administrator, however, has but one choice to make if it cannot be determined that such a call is a hoax. The school must be evacuated. The following are acceptable procedures to follow in such cases:

1. Obtain as much information as possible from the person making the call.
2. Ask the caller to give the exact location of the bomb.
3. Obtain from the caller the time when the explosion is to occur.
4. Call fire and police departments and follow instructions given.
5. Evacuate the building if police issue such an order.

RIOTS. Indeed riots can be most disastrous. In general, they are unnecessary occurrences that injure and take the lives of human beings. Man-made activity of this type may be either planned or spontaneous. Riots have been known to occur in schools, public places, prisons, and industrial establishments.

Such events in the school have been rather orderly proceedings with little or no damage resulting. However, in the other places listed above, riots have caused considerable damage and lives have been lost. The best course to follow if caught in such circumstances is:

1. Remain calm.
2. Attempt to reason with the leaders if you know them and request a termination of the activity.
3. Call the police and await their arrival.
4. Go into seclusion for protection if riots become serious.

## RESPONSIBILITY FOR PLANNING

It is recognized that in order to have an adequate disaster preparedness program, it must be carefully planned. There are certain major planning responsibilities that fall on the shoulders of governmental agencies beginning at the federal level and reaching down to the local municipality. At each of these levels responsibility must be accepted, and programs organized and implemented for the public's safety.

### NATIONAL LEVEL

Preparations for emergencies must necessarily begin at the national level. Support of this type is needed to give direction and confidence to all

**BOARD OF EDUCATION.** The school board is responsible for the educational programs offered in the school. In view of the fact that disaster preparedness includes the protection of students, faculty, staff, and facilities, it should be a primary concern of the board. It must be kept in mind that every school in America is a potential target for some type of disaster. The below-listed items are considered minimum responsibilities of the board of education in disaster preparedness programming:

1. Organize and implement a training program for administrative and teaching personnel.
2. Co-ordinate the school program with the community plan.
3. Co-operate in the development of a general disaster preparedness plan for the school and keep it up to date.
4. Assist local school disaster preparedness co-ordinators in planning for the use of school facilities and personnel.
5. Provide personnel, facilities and funds for carrying out the school's responsibility in local disaster preparedness.
6. Develop a public relations program to acquaint the parents with the disaster preparedness preparations of the school.

**SCHOOL ADMINISTRATOR.** The local school administrator is responsible for organizing and conducting a disaster and survival program in all the schools under his supervision. The administrator is ultimately responsible for the safety of all students; therefore, it may be advantageous to delegate responsibility for the organization and implementation of this program to the supervisor of safety education. In smaller communities that might well become a responsibility of the driver education teacher. Regardless of who heads up the program, the following would be the basic duties involved:

1. Carry out the policies of the board;
2. Direct the organization of an adequate disaster preparedness program for the school;
3. Conduct evacuation drills;
4. Supervise the teaching program;
5. Inform parents of the school's plan;
6. Co-operate with official and voluntary groups in the community.

**TEACHER.** It falls to the lot of the teacher to make certain that students learn how to conduct themselves during times of emergencies. The teacher, of course, must be well trained and understand his part in the school's disaster preparedness plan. In general the teacher's responsibilities are:

accountable for disaster preparedness; however, a civil defense director is generally appointed and is in charge of the operation. The director co-ordinates all statewide activities with local civil defense units and with adjacent states through regional or interstate compacts or agreements.

#### LOCAL

In general, the local preparedness units, both county and city, attempt to implement the national program. Certain functions of the federal and state plans should be revised as deemed necessary to satisfy the needs of the community. The mayor of each city is responsible for local civil defense efforts. However, it is best for a local director to be named and delegated the responsibility for co-ordination of program efforts. Today, by law, each municipality must have a civil defense director before certain benefits can be obtained from the state and national authorities. Basically, the responsibilities of the city or county in disaster preparedness are:

1. To operate a civil defense system and make necessary mutual assistance pacts with neighboring communities.
2. To provide adequate facilities and staff for civil defense training.
3. To participate in the state program of organized mobile support.

#### THE SCHOOLS

The National School Boards Association reports that, ". . . schools are particularly vulnerable to disaster, and no school is or can be made wholly immune to it. Nevertheless, during the course of a year the lives of hundreds of children are saved because of effective disaster preparedness programs."<sup>5</sup>

**STATE DEPARTMENT OF PUBLIC INSTRUCTION.** For the schools to develop a successful civil defense program, there must be administrative support and guidance from all levels. Such support should begin with the chief state school officer. It is wise for the department of public instruction to have a full-time staff member to advise local school systems. The basic responsibilities of the director would be to evaluate and improve instructional programs, clarify the schools teaching responsibility, interpret disaster preparedness needs to the schools, and designate detailed information on the operation of such programs.

<sup>5</sup> National School Boards Association, *School Boards Plan for Disaster Problems* (Chicago: The Association), p. 9.

### SAFE OPERATING PRACTICES

Standard operational procedures have been developed for nearly all emergencies. However, the safety of citizens depends in large measure on the nature and quality of planning that has preceded any disaster. It is of prime importance that special care be taken in the development of school-centered preparedness programs.

**SIGNAL SYSTEMS.** Safety depends to a significant degree on being able to detect and recognize emergencies and take proper steps for protection. Therefore, a signal system is important to the success of all disaster preparedness programs. An effective communications system is essential in all communities. In general, this system would provide information to the community, whether it be about a tornado, flood, blizzard, or military attack. For such a system to be 100 per cent effective, there must be 100 per cent co-operation between federal, state, and local organizations.

**EMERGENCY WARNING SYSTEM.** The *Emergency Broadcast System* (EBS) introduced in August 1963 is the Nation's current system to provide official information and directions to the public in event of a civil defense emergency. This system replaced the Conelrad system which had been in operation for a period of twelve years. Radio stations holding National Defense Emergency Authorizations will broadcast on normal frequencies with normal power. Standard broadcast stations that are not a part of EBS, and FM and television stations will go off the air in the event of a national emergency. The EBS network permits wide dissemination of emergency information to the public over regular frequencies with normal broadcast power. Broadcast stations involved with the EBS system will not use their call letters but will identify the community in which they are located. This will enable the general public to identify with a specific community rather than station call numbers which could be confusing. Information concerning the EBS system is available through local civil defense authorities.

**PROTECTIVE DRILLS.** Protective exercises can help smooth out many local preparedness problems. The primary objective of all such drills, whether they be for fire, tornado, or air raid, is to determine how effective the plan will be under simulated conditions. It is essentially a plan of educating people to respond to certain emergency conditions. Drills are designed to cause one of four actions to occur: (1) exit the building, (2) evacuate, (3) take shelter, (4) or to take cover. Each of these actions is related to specific types of emergencies and, therefore, should be understood by

1. Keep informed about the school's disaster preparedness plan.
2. Know and understand the effects of the survival techniques for natural and man-made disasters.
3. Give students sound instruction in survival techniques and an opportunity to practice them.
4. Develop an air of confidence in the students.
5. Maintain student's personal data—name, address, parents' name, telephone numbers.
6. During an emergency, stay with the students.
7. Direct students in carrying out emergency action;
8. Render necessary first aid.
9. Report to administrator or supervisor any casualties or missing students.
10. Conduct recreational activities during the time confined to a shelter area.

### ORGANIZING A DISASTER PREPAREDNESS PROGRAM

After a state has organized a program at this level, it becomes the obligation of each county and city to organize a preparedness plan among its own citizens. Local planners should attempt to utilize all existing public resources to the best advantage of the community. Since schools are very important resources, they should play a leading part in the planning and ultimate functioning of the program. The entire structure of a disaster preparedness program is built on a framework of co-operation. Such planning is necessary if normal community activities are to be resumed as soon as possible after a disaster. The following steps are disaster preparedness suggestions from Mr. V. L. Couch of the Office of Civil and Defense Mobilization:<sup>6</sup>

1. Contact the local defense director.
2. Establish leadership responsibility for disaster preparedness.
3. Organize and train employees and/or students.
4. Establish a warning and communications system.
5. Develop emergency shut-down procedures.
6. Develop an evacuation plan.
7. Provide shelters in existing buildings.
8. Participate in mutual aid associations for disaster.
9. Prepare a disaster plan manual.

<sup>6</sup> Office of Education, *Education for National Survival* (Washington: The Office, 1956), p. 88.

uncontrolled. Second, determine if the victim is breathing. In general, this is just as important as hemorrhage. However, with few exceptions, respiration will be present as long as the heart is operating sufficiently to produce severe bleeding. The most practical method of detecting expired air is to hold one's face or hand close to the individual's nose or mouth. Liquids, hot or cold, should not be given until consciousness is regained or the type of injury is determined.

**KEEP PERSON LYING DOWN.** Never be in a hurry to move an injured person. Protect the injured from any unnecessary manipulation and disturbance. The patient should be made comfortable by placing blankets beneath his body. Caution should be exercised so that the injured part is not aggravated. Attempt to keep body temperature constant and never overheat the patient.

**CHECKS FOR INJURIES.** The first aider's basic objective is to carefully check for injuries. Many times this task is simple when the victim can identify the injured area. Other times, however, a check of the head, neck, trunk, and each extremity is necessary to determine what part of the body is injured. The general condition of the patient must be constantly observed, and the first aider should prevent any sudden movement of any part of the injured person's body.

**PLAN APPROACH.** Knowing what to do in emergency cases is not enough. The person in charge of the injured patient must plan every act so that each move will help toward the recovery of the patient as quickly as possible. A planned, organized approach eliminates confusion and implements assistance given to the accident victim.

**APPLY FIRST AID.** The application of necessary first aid measures should not be hurried. The use of improper methods and the loss of the injured person's confidence may result if a hurried approach is used. After the nature and extent of the injuries have been determined, the first aider should proceed to assist the patient as necessary.

### FIRST AID PROGRAMS

Adequate knowledge of first aid techniques will be obtained only through substantial study. Procedures used in emergency care situations are exact and must be applied intelligently. It is desirable for people to acquire such information from a well-organized and well-taught program of first aid. Moreover, a first aid course should be comprehensive and

parents, school children, and the general public. The following outlines the type of emergencies and the necessary action required:

1. Exit drill for (a.) Fire, (b.), Flash Flood, (c.) Bomb Threats;
2. Evacuation drill for (a.) Flood, (b.) Hurricane, (c.) Forest Fire;
3. Shelter drill for (a.) Tornado, (b.) Radioactive Fallout;
4. Take cover drill for (a.) Explosion, (b.) Earthquake, (c.) Tornado.

## FIRST AID

A very frequent result of accidents is personal bodily injury. Injuries require emergency care in the form of first aid. *First aid may be defined as the immediate emergency treatment rendered before the services of a physician can be secured.* Such treatment is usually performed at the scene of the accident. Since accidents occur at home, work, or play, it is essential that a competent first aider be available. Recognizing that emergency needs are great, it is recommended that at least one member of each family enroll and complete a basic first aid course.

## BASIC PRINCIPLES

The individual applying first aid should be guided by a set of acceptable principles. These principles should be designed to guide the person so that he would apply appropriate care, would not exaggerate the condition, or in any way be subject to a libel suit against himself in the future. The following is a discussion of some basic principles that should serve to help the first aider administer emergency care in an acceptable manner.

**OBSERVE SURROUNDINGS.** One should make a quick survey of the conditions related to the injury or accident. Accurate observations of conditions may lead to the discovery of the kind of injury. Body position may also help in determining the type of injury. A few glances around the scene of the accident may reveal whether there are any weapons, objects, or other contributing circumstances to the injury. Naturally, valuable time should not be lost in collecting this data; this information should be secured while the first aider is working on the patient.

**IMMEDIATE AID.** The first aider must act quickly when he attends an injured person. The most important thing to look for is bleeding. If the injured person is hemorrhaging, it must be stopped as quickly as possible. Bleeding from a major artery can result in death in less than a minute if

The nation, state, and local community must join hands in the effort to organize effective programs of disaster preparedness. Co-operation is the foundation of such efforts. It is emphasized that the school should be among the first to take the necessary steps toward such ends. The lives of millions of school children are at stake daily and, therefore, the responsibility for the protection of the school population must not be neglected. In today's troubled world every man, woman, and child should face realistically the probability of a disaster some time during their lifetime. It is only through adequate preparedness programs that a person can be assured of a long and fruitful life, free from disaster in the 20th century.

## ACTIVITIES

1. Develop a comprehensive civil defense plan for a school or school system.
2. Make a thorough inspection of a school or public building and determine all such places that could be utilized as all-purpose shelters for tornadoes or nuclear attack.
3. Prepare an evacuation plan that could be used by a school in case of a building disaster.
4. Contact the local civil defense agency and interview the director. From such an interview determine the extent of the local disaster plans relative to all types of community disasters.
5. Plan a teaching unit on the general theme of disaster preparedness with application to the secondary school level.

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cover all typical injuries that are common to everyday life. Such a course should contain the following units of instruction:<sup>7</sup>

- Unit 1 The Why and How of First Aid.
- Unit 2 Wounds.
- Unit 3 Shock.
- Unit 4 Artificial Respiration.
- Unit 5 Poisoning by Mouth.
- Unit 6 Injuries to Bones, Joints and Muscles.
- Unit 7 Burns and Ill Effects of Heat and Cold.
- Unit 8 Common Emergencies.
- Unit 9 Transportation.
- Unit 10 First Aid Skills for Standard Course.

#### AGENCIES

There are various agencies that make available first-aid courses of instruction. The most notable among these groups is the American National Red Cross. First-aid activities are a major program of this organization and include standard, advanced, and instructor trainer courses. For complete information, contact a local Red Cross chapter or the American National Red Cross in Washington, D.C.

Public schools, colleges, and universities also teach first aid courses. These courses are taught either as a phase of the regular curriculum offerings or on an adult education level. Instructors for such courses are certified teachers and have been qualified through Red Cross first aid classes.

Organizations such as the Y.M.C.A., Boy Scouts and Farm Bureau also offer first aid instruction as a part of their service programs. Therefore, every person, if he so desires, has the opportunity to acquire first aid skills.

#### SUMMARY

The basic concept underlying disaster preparedness is self-reliance. Under this concept every person in this country has a part to play. Each person must educate himself and his family in self-protection and self-help. True, a disaster may never strike some communities—yet it could happen today. Alert, intelligent preparedness programs are the answer to the saving of lives and the minimizing of extensive suffering.

<sup>7</sup> American Red Cross, *First Aid Textbook* (Washington: The Red Cross, 1957), p. ix.

## Part Four-TOWARD A SAFER FUTURE

The final section of the book is concerned with the future of the safety movement. Will education and research meet the challenge of providing safe living for an expanding population in an increasingly complex society? Professionally trained safety persons will help determine answers to this and other questions.

Included in Part Four are the following chapters:

18. Safety in Adult and Higher Education
19. Evaluation and Research
20. Career Opportunities and the Future.

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## Safety in Adult and Higher Education

IN THE PROCESS OF BUILDING a safer future for the people of the nation, there must be provision for the best possible means of safety education of the present generations of adults and the preparation of leaders of the safety movement for the future. "Life-long education for safety is required to assist adults to adjust themselves to changing conditions and requirements."<sup>1</sup> Safety education in the schools provides immediate protection for children and a long-range program of safety education for future adults. However, the responsibility still exists to provide effective measures of accident prevention for more than 100 million adults who have not had adequate safety instruction in the schools of the nation. "If educators are to perform their duties in a democracy, they should assume more responsibility and provide more stimulation for the safety education program on the adult level."<sup>2</sup>

Just as in science, international relations, or any other field of endeavor, the future effectiveness of safety and accident prevention work will be determined by the quality of leadership that is developed. It is the responsibility of the colleges and universities to conduct needed research, to provide a greater knowledge of the methods and means of accident prevention, and to provide an adequate preparation for those persons who will be assuming the leadership of the safety movement in the years to come.

<sup>1</sup> American Association of School Administrators, *Safety Education* (Washington National Education Association, 1940), p. 189.

<sup>2</sup> A. E. Florio and G. T. Stafford, *Safety Education*, second ed. (New York: McGraw, 1962), p. 58.

official state agency, usually the department of motor vehicles. The commercial driving school program is directed primarily toward instruction in the manipulative controls of the automobile. Little, if any, classroom instruction is given by the typical commercial school.

#### **DRIVER IMPROVEMENT CLASSES**

Driver improvement classes have been conducted in a number of cities throughout the nation for well over 25 years. These classes are sometimes referred to as "Traffic Court Schools" or "Violator Schools," because they are usually designed for persons with poor driving records resulting from convictions for moving violations or accidents, or both. The philosophy behind such classes is that the unsuccessful driving record is the result of either a lack of knowledge or improper attitudes on the part of the driver, and can be corrected more readily through education than through a fine or other type of punishment.

Driver improvement schools deal primarily, but not exclusively, with young drivers. Most persons who have worked with this type of program conclude that it is highly successful. Studies have been conducted in several cities that operate driver improvement classes. These studies indicate that a large majority of the drivers completing the program do not return to the courts for traffic violations. It is interesting to note that the city of Portland, Oregon, has conducted very successful classes for pedestrian violators in addition to classes for driver violators.

Driver improvement classes have been conducted by adult education programs in the schools and as special classes set up by either the police department or the court. Usually the classes are developed co-operatively by the schools, the police, and the courts. Regardless of sponsorship of driver improvement courses, the instruction usually is given by driver education teachers or police officers. Driver license examiners have assisted in the instruction of some of these classes.

Nearly all of the driver improvement classes have offered only classroom instruction. Since the basic problem of the driver violator is generally a combination of lack of knowledge concerning the traffic laws and driving situations, or a poor attitude toward the assumption of his driving responsibilities, the classroom program best meets his needs. Limitation of time and facilities to conduct behind-the-wheel instruction are other reasons why practice driving has been very limited.

Course content of the driver improvement class usually deals with

## EDUCATION OF ADULTS

Providing an effective program of safety education for adults is a very difficult task. For the most part, adults are beyond the reach of formal education. Therefore, we must rely largely upon informal means of group- or mass-methods of education which are most difficult to develop and administer and even more difficult to evaluate. However, a large number of persons are enrolled in adult education courses, and this provides opportunities for safety education instruction. Successful programs of formal safety education for adults have been confined primarily to areas where there is strong personal motivation, such as driver education. The desire to qualify for a driver's license has caused thousands of persons to enroll in courses designed to serve this need. There have been a number of successful programs of adult education of drivers through driver improvement schools. Enrollment in such classes has been, for the most part, the result of court assignment which is a means of coercion rather than voluntary participation. Adult education courses also have been conducted in such areas of safety as hunting, boating, swimming, truck driving, first aid, and individual and family survival. However, the informal type of education provided through the various communications media and safety programs of organized groups and agencies still is the most widely used means of safety education for the adult population.

### ADULT DRIVER EDUCATION

Extensive programs of adult driver education have been conducted in the public schools for many years. These programs are similar in nature to the courses offered to high school students, but usually place less emphasis on the classroom phase of the program and devote a larger portion of the time to practice driving instruction. Adult programs of driver education are conducted by the schools as a part of the regular adult education program of the district. Most often the classes are taught by regular high school teachers during the late afternoons or evenings. However, police officers, driver license examiners, and other traffic safety specialists with provisional or limited service credentials have been employed for this purpose in some districts.

Many thousands of persons receive instruction in driving each year through commercial driving schools. These schools are licensed in at least seven of the states so that they must operate within the regulations of an

cating the public on various phases of safety. It is always the first group to be called upon to support a safety campaign, whether it be of local, state, or national dimension. It has contributed to safety programs on traffic, home, back-to-school, water safety, and many others. The press coverage of the holiday safety campaigns of the National Safety Council has been continuous over a period of more than a quarter of a century. In addition to this special coverage, many papers print "box scores" of traffic fatalities and injuries daily. Each day they give a record of traffic deaths for the current year to date, compared to the previous year. Newspapers also provide daily accounts of traffic and other types of accidents in local news stories. Sunday magazine sections of newspapers publish informative and provocative feature articles relating to safety. The broad newspaper coverage of the many facets of the accident problem must be recognized as one of the most widely used means of safety education for the general public.

#### RADIO AND TELEVISION

Radio and television are important media communication vehicles in providing safety education for the public. They are required to provide a portion of their broadcast time in the interest of public service. When safety materials of general interest to listeners and viewers have been available, they have been most generous in contributing broadcast time for this purpose. Like the newspapers, these media include safety material, particularly on traffic safety, in their coverage of local news. Mr. Alfred P. Sloan said, "Radio and television have added a new dynamic to the nationwide effort to curb traffic accidents. Broadcasting has become a potent educational force for informed opinion and constructive safety action throughout the country."<sup>4</sup> They have supported many types of safety campaigns and presented numerous special broadcasts. A short time ago one of the major television networks presented an hour-long special broadcast on traffic accidents that was given a prime-time spot on a nationwide network. Special radio and television programs for young children such as the Safety Story Lady<sup>5</sup> have been based on a safety theme. Radio and television probably will be an important factor in future public education in the safety field.

<sup>4</sup> Automotive Safety Foundation, *ASF Report* (Washington: The Foundation, June 1962), p. 14.

<sup>5</sup> Freeman L. Evans, "Safety Story Lady Makes TV Debut," *Safety Education*, Mar. 1962, pp. 12-13.

basic causes of accidents, driver attitudes, driver characteristics, physical forces and driving, insurance and financial responsibility, and rules of the road. The average course is conducted in from three to six sessions of two hours each. The use of appropriate traffic safety films, psychophysical testing devices, and other visual aids is a common practice. The more basic and stimulating the instruction, the greater the possibility of developing improved driver attitudes. Although classes of this type have demonstrated great promise of improving the driving practices of unsuccessful drivers, driver improvement classes still are available to only a small minority of traffic violators.

### MASS MEANS OF EDUCATION

Most safety education for adults must be conducted through the informal channels of mass media and occasional presentations to large groups rather than through the more formal conditions of the classroom. Although this procedure is much less effective than regular instructional programs, it is the only way to reach the millions of adults who have completed their formal education. "Public information in the traffic safety field is a long range continuing job—and a rewarding one now and for the future."<sup>3</sup> Because of time limitations and the nature of the educational problem involved, such programs of mass safety education are developed frequently in the form of campaigns. Often the campaigns are conducted around a slogan such as "Courtesy is Contagious." There has been a great deal of criticism of this approach to safety education. One such campaign was described as "an excursion into futility." However, since campaigns of this nature provide a practical way to reach large numbers of people in a short period of time, and because they are believed to have some value in reducing accidents, they will continue to be an important part of adult safety education. Frequently these campaigns are supported through the use of many types of safety instruction. Some of the means of conducting safety education programs for the general public include the press, radio and television, magazines, outdoor advertising, public and private agencies, and community clubs and organizations.

#### PRESS

The press of the nation contributes many thousands of column-inches of news, feature, and editorial space each year for the purpose of edu-

<sup>3</sup> William R. Hearst, Jr., "Hometown Story," *Bulletin of American Association of Motor Vehicle Administrators* (June 1962), p. 9.

of public safety education. The types of services and activities that they have conducted are so numerous that only a few can be indicated here.

**PUBLIC AGENCIES.** The many millions of copies of state motor vehicle code summaries that are distributed annually to persons obtaining or renewing their driver's license is one of the largest public education programs in the nation. It is of course the major source of information on rules of the road for potential drivers. State highway patrols and the courts have co-operated in the preparation of traffic safety films that have been a major medium of public traffic safety education. The many official agencies provide speakers for all types of public meetings where traffic safety messages are brought to the public. Other agencies of government have provided similar services in the interest of child safety, water safety, home safety, and others. Numerous safety exhibits at fairs and other public functions are presented by both public and private agencies.

**PRIVATE AGENCIES.** Private agencies such as insurance companies, automobile clubs, automobile dealers and manufacturers, and many others publish and distribute millions of safety pamphlets and other publications to the general public annually. Such publications deal with all phases of safety and constitute a major source of safety education materials for the adult population. Private agencies also provide safety specialists for thousands of speaking engagements before all types of citizen organizations. These agencies have also been major supporters of local safety councils and other organized safety programs. Their trained staff provides leadership, technical assistance, and acts as participants in numerous types of safety meetings and conferences.

#### **CLUBS AND ORGANIZATIONS**

A large majority of the clubs and organizations throughout the nation have a safety committee. These committees arrange for club safety programs and develop safety projects to be carried out by their organizations. Through this medium, millions of adults are reached with safety messages each year. Also, many worthwhile projects relating to all aspects of safety are conducted by these groups. These campaigns have included everything from a local service club's courteous driver program to the nationwide seat belt campaign sponsored by the Junior Chamber of Commerce. The many clubs and organizations in the United States provide an ideal avenue for the continued projection of the safety education of the general

## MAGAZINES

National magazines have emphasized many types of accident prevention materials. Through their editorials, picture stories, and feature articles, they have presented safety materials that have particular interest for their readers. News magazines have emphasized articles of current interest or in support of particular projects. *Look Magazine* has jointly sponsored with the Auto Industries Highway Safety Committee a national program of voluntary motor vehicle inspection. Each year it has had a major feature article describing the program and educating the public to its values.

Nearly every magazine directed to women's interests publishes several safety articles every year. These articles deal with general safety problems but are concerned primarily with home and family safety. Many children's magazines have stories and features stressing safety for young people. Sports magazine safety articles are directed toward recreational safety, while motor magazines emphasize various aspects of highway safety. In addition to the national magazines, house and trade publications of many industries and organizations have frequent safety features. The magazine publishing industry has made a significant contribution to public safety education.

## OUTDOOR ADVERTISING

The outdoor advertising industry has made a large, although not generally well-understood, contribution to public safety education. Each year millions of dollars worth of billboard advertising space is made available free of charge by the industry for the purpose of public education on various types of safety. This is most often in co-operation with local, state, or national campaigns. A good example of this program is the millions of dollars worth of billboard space provided annually by members of the Outdoor Advertising Association of America in the national summer vacation travel campaign, "Slow Down and Live," sponsored by the Association of State and Provincial Safety Coordinators.

## PUBLIC AND PRIVATE AGENCIES

The joint efforts of public and private agencies in providing safety education for the general public have been one of the most important aspects

tion are offered at many institutions. Majors in physical education, health education, home economics, industrial education, and elementary education frequently are required or advised to include safety education as a part of their teacher preparation program.

In addition to the specific courses in safety, there are many others that emphasize safety and accident prevention materials. Integration of safety instruction is found in many courses in social science, educational psychology, physical education, industrial education, home economics, business management, and engineering.

Since every teacher has a responsibility for safe care and instruction of children, provision should be made for the development of competence in this area in programs of teacher preparation. Each teacher should have a positive philosophy toward his safety responsibility, understand the problems of providing safety for children, and have the ability to provide stimulating and effective instruction in safety education. Also, he should be able to perform the safety functions of providing a safe classroom environment, complete accident reports properly, and prepare students to meet the hazards of their environment through the development of proper attitudes and safe habits.

#### RESEARCH

Colleges and universities provide a major portion of the research conducted in safety and accident prevention. There have been over one hundred doctoral-level research studies in safety. Particular emphasis is being placed on research in this area by the Safety Research and Education Project inaugurated at Teacher's College, Columbia University in 1957. The subject matter of graduate research has included teacher preparation, driver education, driver licensing, driver behavior, attitude scales, handicapped drivers, and industrial workers. These studies have made a definite contribution to the field of knowledge in safety and accident prevention. Also, they have provided training and experience for many of the persons who are assuming the leadership of the safety movement in the nation. In addition to graduate research, some faculty research studies in the accident prevention field are now in progress. Additional funds are being made available for research studies, and the contribution will be even greater in the future. Research in accident prevention is discussed at greater length in Chapter 19.

population that cannot be reached through more direct types of formal safety education programs.

### SAFETY IN HIGHER EDUCATION

Higher education has several unique functions in the field of safety education. The universities provide the greatest potential for conducting needed research in accident prevention, particularly in safety education for the schools. Colleges and universities have the responsibility for the training of teachers in safety and driver education and providing general safety education for all teachers. Leadership training in accident prevention other than school safety is conducted primarily through the college program. There has been an increase in attention to safety on the college campus during recent years. All of these functions are unique responsibilities of higher education.

### TEACHER PREPARATION

There are nearly 400 colleges and universities providing courses in safety and driver education for teachers in the United States. Most of these classes are conducted to prepare high school teachers of driver education. The need for this program is growing continually as the various states are gradually increasing credential requirements for high school driver education teachers. Several states now require a minor in driver education, or its equivalent, to teach this subject.

Teacher education institutions have a vital role to play in safety education. It is their task to prepare teachers for all levels—elementary, secondary, and higher education—as well as safety educators for various volunteer and public agencies; educational administrators and supervisors; and educational research workers.<sup>6</sup>

Safety courses taught in the colleges include general safety education, driver education, advanced driver education, driver simulators, psychology of safety, organization and administration of safety, and the use of visual aids in safety education. Additional courses in health and safety, safety in athletics, water safety, first aid, and fire prevention and protec-

<sup>6</sup> National Commission on Safety Education, *Final Report, National Conference on Safety Education by Colleges and Universities* (Washington: National Education Association, 1951), p. 25.

nel and regional courses in state traffic safety management. Many other colleges and universities conduct different courses to meet local needs. In co-operation with the American Association of Motor Vehicle Administrators, courses are conducted each year in various areas of driver licensing and driver improvement at Northwestern University, Northeastern University, University of North Carolina, and San Jose State College.

#### SAFETY CENTERS

The Center for Safety Education was established at New York University in 1938 for the purpose of providing a concentration of leadership training and research in the field of safety education. At that time there were very limited opportunities for advanced study in safety in the United States. For nearly 20 years the Center, through its on-campus program and extensive field services, gave needed in-service training to many people in safety education. Over half of the doctoral level research studies in safety are products of the Center's graduate students. Pennsylvania State University and Purdue University had Institutes of Public Safety that provided different types of training. However, as safety education, particularly high school driver education, grew, the need for additional centers located throughout the country became more apparent. There was a need for such services to be located in many regions of the country. Under a grant of funds from the Automotive Safety Foundation, Michigan State University surveyed the need for a broad program of higher education in traffic safety. Eventually the Michigan Highway Traffic Safety Center was developed at that institution. This center provided training for teachers, school bus drivers, police officials, traffic engineers, and the courts. From this beginning, the land grant colleges surveyed the need for providing a similar type of service in other regions of the nation. At a meeting in Chicago in 1959, representatives of interested colleges and universities met and organized a group that has become the Division of College Safety Centers of the Higher Education Section of the School and College Conference of the National Safety Council. This division exchanges information on the establishment of college safety centers and the means of developing them to meet the needs of the various regions of the country. There are now about 15 colleges and universities in many regions of the country that have safety centers in some stage of development. Most of the safety center programs include research activities, teacher training, and leadership training in specific areas of safety to meet the unique needs of their location. Some of the centers are devoted

## PUBLICATIONS

Colleges and universities have developed many safety publications that have contributed materially to the development of safety education. These publications include reviews of doctoral level and other research projects at these institutions in addition to many promotional safety materials that have been used to advantage in safety education and accident prevention work. This dissemination of new information in the field has been an important contribution. Higher education institutions have issued additional publications designed to meet specific needs for the promotion of safety within their particular states.

## LEADERSHIP TRAINING

Safety and accident prevention can grow only as rapidly as leaders are developed to assume responsibility for carrying on the work. It is the responsibility of higher education to provide the needed leadership training in all areas of safety and accident prevention. The need for college training in highway safety was expressed in a workshop conducted at Northwestern University as follows: "The control and safety of street and highway traffic is now emerging as a new field in which specialized college and university training is needed by those who would capably fill positions within it."<sup>7</sup> Leadership training includes courses taught at both undergraduate and graduate levels, seminars, leadership conferences, and field work that takes in-service training into the field to meet the needs of personnel actively engaged in safety work. College programs in safety education, armed services training, industrial safety, motor vehicle administration, conferences on laws and ordinances, safety management, traffic engineering, police administration, safety legislation, fire prevention, and citizen support for safety activities are some of the types of leadership training programs that have been conducted frequently in co-operation with other public or private agencies interested in various aspects of the safety program.

Institutions of higher education conduct a number of special training programs relating to various aspects of safety. Yale University has a program for traffic engineers. Northwestern University, through its Traffic Institute, gives instruction in police administration and motor vehicle administration. New York University conducts courses for military person-

<sup>7</sup> National Commission on Safety Education, *College and University Traffic Training* (Washington: National Education Association, 1949), p. 3.

programs such as driver education or driver improvement courses. However, most adult safety education must be conducted on an informal basis. Such education can be conducted most effectively through the media sources of the press, radio and television, magazines, and outdoor advertising. Public and private agencies, working through community clubs and organizations, can provide additional adult safety education. Although it is difficult to measure accurately the effectiveness of such informal safety education, it is considered to have a positive value and will continue to be a primary source of public safety education.

Institutions of higher education have a unique role in the field of safety education. They provide needed research and leadership training, including the preparation of teachers of both safety and driver education. They conduct special courses and seminars for leadership and in-service training for personnel actively engaged in various phases of safety work. Colleges and universities provide regional centers for advanced study and research. They also have a responsibility for greater emphasis on safety on their own campus.

## ACTIVITIES

1. Survey the course offerings of your local high school adult education program. What courses are primarily safety education? What courses integrate safety education into the instruction?
2. Form a committee to prepare an educational campaign for home safety in your community. Assign members of the committee to prepare the following campaign materials to present to the class: (a) the campaign slogan, (b) news releases, (c) a three-minute TV skit, (d) home safety posters, and (e) a speaker's fact kit.
3. Visit a traffic court school. Make an oral report to the class describing its effectiveness as a means of reducing traffic accidents.
4. What is the college or university safety center nearest to your campus? Describe, in writing, the program offered by the center.
5. Review a research study that has been conducted in safety education. Tell how it can be used to improve instruction in safety education.
6. Interview the campus safety co-ordinator on your campus. What per cent of his time is devoted exclusively to campus safety? Prepare a written report describing his safety functions.

specifically to traffic safety, but most of them consider other aspects of the safety field as well. The objective of most center programs is similar to that of Southern Illinois University, which was expressed in these words: "The stated purpose of the safety center is to cope with the accident problem in the state of Illinois."<sup>8</sup> In the not too distant future, there are certain to be several well-established regional centers for safety education providing opportunities for advanced study and research to persons interested in professional careers in the accident prevention movement.

### CAMPUS SAFETY

"In general, the college safety movement has been slow in getting off the ground."<sup>9</sup> Until recent years, there was little organized effort for the development of comprehensive programs of safety on the college campus. As student populations at institutions of higher education grew rapidly during the 1950's, bringing growing problems of traffic on campus and a number of serious campus fires, the need for organized safety programs became more apparent. In 1949 a group of persons charged with campus safety responsibilities organized the Campus Safety Association of the Higher Education Section of the National Safety Council. This organization has grown in membership from seven colleges to a present membership of over 375. The Association has prepared standards for campus safety activities and holds an annual conference where it discusses mutual problems. It has established the need for a campus safety co-ordinator on every college campus. The co-ordinator's function is to co-ordinate all of the safety responsibilities of both the administrative and academic functions of the institution and the students on campus, although he deals principally with environmental safety. It is a responsibility of higher education institutions to provide a maximum degree of safety for all students of the college, both resident and nonresident, and the employees of the institution.

### SUMMARY

Education of adults in safe practices and procedures is an important but most difficult job. Some adults are reached through formal education

<sup>8</sup> James E. Aaron, "Southern Illinois University's New Safety Center," *Safety Education*, Feb. 1962, p. 6.

<sup>9</sup> Daniel P. Webster, "The College Campus, Safety's Stepchild," *Safety Education*, Dec. 1961, p. 24.

## Evaluation and Research

EVALUATION is an essential activity in safety education as in all areas of society. *Evaluation is, in essence, the process of determining the success or value of either a person's performance or a planned activity. It often includes the degree or level of success or failure.* Evaluation is an activity that is continually conducted on an informal or formal basis. For example, both during and after the completion of a safety program designed to encourage people to observe necessary safety procedures in the use of insecticides, the program developers are continually asking whether they are reaching as many people as possible, whether these people understand the program, and whether they will use insecticides in a safe manner after learning these procedures. In seeking answers to these questions, it is necessary to observe the number of people in attendance, talk with them, observe their activities, and consider past performance in determining improved behavior patterns. More formal methods of evaluation might be used to obtain answers which more thoroughly evaluate the questions. These methods could include a statistical comparison of accidents before and after the formal program teaching the safe use of insecticides.

Evaluation procedures may be as simple as a speculative discussion between program planners, or they can involve a complex research study which may take years to complete, such as on the accident reduction effectiveness of high school driver education. Whatever the scope or nature of the program, evaluation is a process which must be an integrated part of early planning and must even be considered during the actual execution of the meetings and other activities.

The broad concept of evaluation is not just the concern of safety education, nor the concern of education alone, but is one of the major problems of society. For example, people are continually evaluating schools to determine which one is best for their children, products to determine

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dependence of evaluation and research will be emphasized throughout the chapter.

### FUNCTION OF BEHAVIORAL SCIENCES IN SAFETY EDUCATION

Evaluation in accident prevention and safety education must involve many of the procedures established for evaluation in psychology and sociology. This is the result of the close relationship of safety to those behavioral disciplines. As discussed in earlier chapters, safety involves the behavior of people reacting to situations existing in the environment, as well as the modification of equipment and materials to make them safe for use. Whenever the behavior of people is considered, evaluation procedures must take into account the numerous chance factors and the infinite differences between people.

Probably the greatest evaluation problem facing safety personnel is the difficulty in evaluating personality and attitude changes. Since the fundamental objective of safety is to develop socially acceptable attitudes toward safety activities, evaluation in safety must center around determining the extent to which these desirable attitudes have been developed. Unfortunately, this is not an easy task. Evaluation in this area has made tremendous strides during the past three decades. However, attitude scales which can be rapidly administered to large numbers of people or classes of students have had a minimum acceptance in the profession. In general, they have demonstrated little ability to show attitude changes among people and students familiar with testing procedures. The more discriminating testing procedures available to social psychologists can evaluate attitude change with a relatively high degree of accuracy. However, most of these must be administered to one person at a time and corrected by a specially trained person. As a result, time limitations prevent these more discriminating tests from being used by professional safety personnel and teachers.

In order to overcome the inability to measure attitude change under normal class or group procedures, every effort should be made to evaluate the effectiveness of the methods employed to modify attitudes. This evaluation will provide indirect information regarding the effectiveness of attitude change. For example, the presentation of factual information regarding the scope and nature of the accident problems facing society is ..

which to purchase, communities to determine where to live, and politicians to determine who will make the best government official. In essence, people are continually engaging in informal programs of evaluation. Unfortunately, these evaluations are often based on incorrect information, stereotypes, or partial information. Safety education, as well as all of education, has often been the victim of erroneous evaluation. Such comments as "Let's drop driver education from the schools; we're still killing 40,000 people annually," or "Why teach fire prevention; we're still having forest fires and people are still being trapped in fires" are examples of evaluations based on partial information. These critics failed to consider what the scope of the problem would be if these education programs had never existed, or how extensive the problem would be if these programs would be improved. These questions can be answered, but only through well-planned programs of evaluation which often involve the disciplines of research.

Evaluation is a principle function of research programs. Whenever a question of past, present, or future success of a safety activity is raised, the possibility of an evaluative program of research exists. For example, if the effectiveness of the new federal interstate highway system in reducing the number of accidents is questioned, a statistical analysis can be made of the number and severity of accidents on the new highways compared with statistics from other interstate routes and/or past statistics from roads replaced by the new system. Within limitations, this *research study will evaluate* the effectiveness of the new roads in reducing accidents.

Many forms of research do not directly involve evaluation. Yet some facets of evaluation are implied and become an internal part of virtually every program of research. Even if a philosophical study to identify objectives of safety education is being conducted, the researcher must continually raise the question of whether errors are entering the study and whether his final results will be an accurate presentation of the needs and objectives of safety education. These latter factors are all forms of evaluation.

It is impossible to make a major separation between evaluation and research. Complex evaluation activities must involve an adherence to the disciplines of research. At the same time, evaluation is an integral part of all phases of research, just as it is an integral part of all human activities.

This chapter will identify the role of both evaluation and research in safety and accident prevention. They will be separated and treated individually in the following section. However, the interrelationship and inter-

## EFFECTIVENESS OF SAFETY PROGRAMS

Community safety programs are designed to produce behavioral changes in adults and provide them with the necessary information to prevent accidents. In order to accomplish these objectives, community leaders and safety specialists must work together to provide programs which accomplish the following:

1. Provide information describing the scope and nature of the accident problem.
2. Describe how accident situations may be avoided.
3. Provide the opportunity and conditions for people to make the necessary behavioral changes and react in a safe manner.

In normal practice, these programs consist of factual presentations in newspapers and journals, on radio and television, on posters and bulletin board displays, in free pamphlets, and through public service presentations before various community and civic groups. In all of these programs the basic question of evaluation must be asked—*Is the program effective in accomplishing its stated objectives?*

While effectiveness is the basic question in evaluation procedures, it is not the only one to be considered. Evaluation of safety programming can provide information regarding the following questions which should be asked upon the completion of a program.

1. Has the program been sufficiently effective to justify repetition with another group? Or has the effectiveness been so low that the energy and effort spent in producing the program could have been expended more profitably in other ways?
2. What modifications and changes should be made to make following programs of the same type more effective? This should involve a consideration of every phase of the program and an analysis of its contribution to the over-all objectives. In addition, the effectiveness of individual program participants also should be considered as part of this phase of program evaluation.
3. Does the over-all evaluation, including modifications, justify the continued existence of the program?

Certainly, the answers to these questions are not easily obtained. However, evaluation procedures can be developed which will provide information related to all aspects of safety program effectiveness.

The normal evaluation procedure of using a written test to ascertain the extent of learning is not appropriate to community safety programs.

generally considered as basic knowledge for the modification of attitudes. While it is impractical to measure the effectiveness of this presentation in changing attitudes, normal evaluation procedures can be used to determine the extent to which the group understands *the scope and nature of the accident problem*. Similar evaluation can be made of other efforts designed to promote the basic objectives of safety. The following sections (pages 405 to 419) will describe the testing methods which can be used to evaluate the methods employed to modify attitudes, as well as the methods directly used to measure attitude change and factual knowledge gained.

Another factor which must be considered when evaluating the effectiveness of safety activities is the role chance plays in accident statistics. It has been well stated that virtually all accidents are caused, and could have been avoided through the application of accident prevention methods at the appropriate time. However, the distribution of accidents and the fluctuation of severity of injuries vary from situation to situation by chance factors. For example, two cars are involved in a fatal-head-on collision. In one car the driver lost control, crossed the center of the road, and hit the oncoming car. The number of people in each car is a chance factor. Logically there could be one to six (or more) occupants in each vehicle. The number of occupants helps determine the number of people killed in this accident and, therefore, determines the severity of the accident (if number killed is being used as the index).

Statistical probability and chance must be considered in the evaluation of the success of any safety program which is designed to reduce accidents. While research procedures consider chance factors through statistical analysis, evaluation procedures which follow accident prevention programs often must make judgments based on available information. These judgments generally consider only percentage changes and fail to evaluate chance factors. In the example cited in the previous paragraph, the accident could kill 12 or more people. This one accident could provide percentage figures of fatalities which might offset five or six other head-on collisions. Simple percentage evaluations cannot take into account chance factors. Statistical procedures can, however, incorporate the probability factor and should always be used in this type of program evaluation. Unfortunately, these procedures are often involved and time-consuming, and to be accurate usually require a relatively long period of time to gather sufficient data for the analysis.

- e. Comment and group discussion.
- f. Distribution of pamphlet describing points emphasized by program.

3. Evaluation—distribution of questionnaire to evaluate the meeting and request recommendations for improving the remaining programs planned for the series.

The evaluation of the immediate program consists of two parts—observation during the program and analysis of the questionnaire following the meeting. One of the program planners should observe the audience, noting attentiveness, nature of questions, extent of discussion, and a general evaluation of interest and participation. This should take the form of information notes, so they can be evaluated and weaknesses in the program corrected.

The second phase of the evaluation consists of a study of the replies to the questionnaire. The questionnaire should provide leading questions on each phase of the program, questions related to value improvement, and a general set of questions based on over-all acceptance or rejection. In addition, each person should have the opportunity to make general comments and recommendations. The questionnaire should be collected before the people leave the meeting. It must, therefore, be brief but pertinent. From this information the program developers should be able to determine the general effectiveness of the program and make modifications and improvements in remaining programs.

The second form of evaluation should be followed—a study of accident statistics and observation of participants—if a more complete evaluation is desired. In this example, the accident statistics which called attention to the need of the program can be watched and studied to determine the extent of improvement. This information could not be obtained until all programs were completed, since a period of time must pass to provide sufficient opportunity for accidents to occur. The lack of occurrence would then indicate an improvement in the problem and success of the program (providing other factors, such as changing seasons or ending spraying, did not cause the decrease).

*Observation of behavior* is an extremely valuable form of evaluation in traffic and public safety activities. However, when the program involves the behavior of people around the home, observation must either be eliminated or curtailed as a means of program evaluation. In this example, observation would violate normal standards of discretion since it would involve the observation of people as they work around their homes or property.

People usually resist this direct approach and lose all interest in future safety programs. However, more subtle methods can be used which will provide information related to the success of the program, as well as determining changes which might be made in future efforts. These methods include:

1. Observation, interview, and questionnaire during the program;
2. Studying accident statistics and observing participants following the program;
3. Research study planned to provide an accurate evaluation of program effectiveness.

During the planned safety program, such factors as interest and participation can be observed. These factors are directly related to learning and attitude change. Active participation can only be accomplished if the participants have an understanding of the program. In addition, people can be interviewed or asked to complete a questionnaire at the conclusion of the program. This interview or questionnaire can be presented in a manner which will encourage the participant to provide information that can be used to improve future programs.

The continuation of the introductory example dealing with accidental poisoning resulting from improper use of insecticides will illustrate this method of evaluation. In order to combat this problem, a series of public information programs are planned and conducted in the elementary schools of the community. A total of ten programs are planned. The planners are interested in evaluating the first program to determine effectiveness and to learn methods of improving future programs in other schools. The first program consists of these steps:

1. Public invitation—posters, handouts, newspaper articles, and a door-to-door invitation to attend one of the public meetings at the local elementary school (two are planned to accommodate those who have conflicting engagements).
2. Safety program—based on informality and group participation, planned to include:
  - a. Visual presentation using posters, lecture, and discussion of the scope and extent of the problem.
  - b. Demonstration of proper methods of applying different types of insecticides.
  - c. Demonstration of proper clothing.
  - d. Presentation of brief and simple procedure to ensure safe application of insecticides.

measures progress of high school driver education in each of the states and gives recognition to those reaching a set standard of achievement.

4. National Student Traffic Safety Program. This program, conducted by the National Commission on Safety Education, evaluates individual school participation in all types of safety promotion and activities. It provides recognition to those schools with outstanding programs.

### EVALUATION OF SAFETY INSTRUCTION

Evaluation of the formal school program of safety education is necessary to determine the degree of student achievement and the extent to which the course objectives were fulfilled. While the concept of studying only for a grade is discouraged by teachers, the grading system still makes a major contribution towards student motivation. A good program of evaluation will contribute to the educational program in the following manner:

1. Provide an impartial evaluation of student achievement based on the extent to which the student has completed the aims established for the course.
2. Provide information which will assist in evaluating and revising course content and instructional methods.
3. Serve as one means of motivation by providing the student with an accurate evaluation of his accomplishments.

The principal concept for consideration in this section is that *evaluation must be planned to determine the extent to which course aims have been accomplished*. In organizing a program of safety education, whether it is driver education or some facet of general safety, course aims must be established first. Course content, teaching methods, and final evaluation must be designed to complement and contribute to the fulfillment of course aims. If aims of attitude development and an understanding of the scope, nature, and preventive measures for safety are accepted as basic course aims, the evaluation program of the school must determine the extent to which the course has fulfilled these aims. As a result, the program must be broader and have greater scope than the simple testing of learned subject matter.

### EVALUATION OF ATTITUDE DEVELOPMENT

It is very difficult, if not impossible, to simply test a group of students and determine the extent to which they have developed a socially acceptable attitude toward safety. Since a person's attitude is a part of his

The last method of program evaluation involves the establishment of a controlled research program of evaluation. For community activities, this method is often too expensive and time-consuming. However, for large programs which involve considerable time and expense, a research design planned to determine the effectiveness of the program is justified and often necessary to support the continuation or justify the termination of the program.

### **SAFETY PROMOTION THROUGH EVALUATION**

It is possible to combine the promotion of safety programs and evaluation procedures into a single program which will contribute to the development of an accident-free society. This can be accomplished by building the principal part of the program around a combination of self and formal evaluation. In its finest form, this type of program results in competition with one's self in the elimination of accident situations and the development of sound safety procedures.

The National Safety Council's School Honor Roll program is an excellent example of this combination of safety promotion and self-evaluation. In this program, schools are asked to evaluate their own safety program by completing a checklist. This list is analyzed by the National Safety Council and a complete safety report returned to the school. If the school qualifies, its name is placed on the NSC School Honor Roll. In order to remain on this honor roll, the school must continue to improve the safety program. Each year specific requirements are *added* to the school's list. Through the years, the school's program for safety expands and improves. Each year, the school is evaluated on the basis of a more complete and thorough checklist. Other programs which have proven very successful and designed with similar objectives are:

1. The Annual Inventory of Traffic Safety Activities. This program evaluates activities of cities and states in basic program areas recommended by the Action Program of the President's Committee for Traffic Safety. Cities and states are compared with those of similar size. Recognition is given for outstanding programs.
2. National Pedestrian Protection Contest. This program, sponsored by the American Automobile Association, evaluates pedestrian programs in all states and major cities. Recognition is provided for outstanding performance.
3. The National High School Driver Education Achievement Program. Sponsored by the Insurance Institute for Highway Safety, this program

cedures must be based on an evaluation of the success of attitude-changing methods. As described in Chapter 9, socially acceptable attitudes within the limitations of formal safety education are developed through involvement and active participation of students in safety activities. A second method involves the learning of safety course content. The evaluation of the success of these phases of the instructional program will be a strong indicator of the success in developing socially acceptable attitudes.

The principal methods of evaluating the success of group participation in the typical classroom situation are:

1. Teacher observing the interest and motivation displayed by the class members as they work together, enter into general class discussion, seek answers to problems, and prepare and present reports. While this type of evaluation is primarily subjective, it can provide insight into the success of the group activity program and the resultant success in attitude development.
2. Students evaluating the instructional program upon completion of a unit or semester's work. Their attitude towards class activities will be apparent in the evaluation and recommendations they provide. Careful reading and interpretation will reveal the extent of their interest and motivation in safety activities.

Reliable and valid methods are available for the measurement of the extent to which class members have learned the course content. This can be accomplished through any of the subjective or objective testing procedures described in the following sections. The success in course content can be combined with the general evaluation of interest and motivation to provide an evaluation of the development of socially acceptable safety attitudes.

#### SUBJECTIVE VS. OBJECTIVE EVALUATION

*Objective tests are ones which leave little or no opportunity for disagreement on the correct response. True-false, multiple-choice, matching, and completion questions are generally used in objective tests. Subjective tests, on the other hand, require personal judgment on the part of the evaluator. Essay questions, short-answer questions, and oral examinations are typical testing procedures which must receive subjective evaluation.*

In determining which type of examination to use, the following strengths and weaknesses of each method should be considered:

1. Objective tests—advantages:

personality, the evaluation of attitudes must utilize psychological methods of evaluation. The principal group method of attitude evaluation uses the Likert form of attitude scale. Unfortunately, the number of scales designed for measuring safety attitudes is extremely limited. The principal one in use is the Siebrecht scale, which measures a person's attitude toward certain functions of driving. The following examples are taken from the Siebrecht scale and illustrate the type of statements used.<sup>1</sup>

1. Driving is a cooperative affair in which the motorists share alike on the highways.

Strongly  
Agree<sup>5</sup> Agree<sup>4</sup> Undecided<sup>3</sup> Disagree<sup>2</sup> Disagree<sup>1</sup>

2. A tired motorist should drive slowly until drowsiness leaves him.

Strongly  
Agree<sup>5</sup> Agree<sup>4</sup> Undecided<sup>3</sup> Disagree<sup>2</sup> Disagree<sup>1</sup>

3. Improved construction of automobiles makes driving skill less necessary today than five years ago.

Strongly  
Agree<sup>5</sup> Agree<sup>4</sup> Undecided<sup>3</sup> Disagree<sup>2</sup> Disagree<sup>1</sup>

A possible weakness of this scale is the degree of "test awareness" which students develop. Many educators contend that while the test attempts to evaluate attitudes and potential behavior patterns, it must make value statements regarding safe behavior. From class instruction, students may learn the proper response and be able to list it even though they may not believe it. This action may decrease the effectiveness of the Siebrecht scale in determining attitudes following a regular instructional program. An attempt has been made to account for these learned responses by adjusting the test evaluation procedures. The Siebrecht scale, however, remains as a relatively sound method of evaluating driving attitudes among people who have had little or no formal safety education in recent years.

Most of the remaining techniques which have been developed for evaluating attitudes involve a considerable investment of time and often require a trained psychologist to evaluate the results. Therefore, these relatively valid techniques for measuring attitudes are not really adaptable to the school program. Other methods must be used to gain insights into the extent to which proper attitudes have been developed. These pro-

<sup>1</sup> Elmer B. Siebrecht, "Siebrecht Attitude Scale" (New York: New York University, 1941). (Used with permission of author.)

cedures must be based on an evaluation of the success of attitude-changing methods. As described in Chapter 9, socially acceptable attitudes within the limitations of formal safety education are developed through involvement and active participation of students in safety activities. A second method involves the learning of safety course content. The evaluation of the success of these phases of the instructional program will be a strong indicator of the success in developing socially acceptable attitudes.

The principal methods of evaluating the success of group participation in the typical classroom situation are:

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#### **SUBJECTIVE VS. OBJECTIVE EVALUATION**

*Objective tests are ones which leave little or no opportunity for disagreement on the correct response. True-false, multiple-choice, matching, and completion questions are generally used in objective tests. Subjective tests, on the other hand, require personal judgment on the part of the evaluator. Essay questions, short-answer questions, and oral examinations are typical testing procedures which must receive subjective evaluation.*

In determining which type of examination to use, the following strengths and weaknesses of each method should be considered:

1. Objective tests—advantages:

- a. Reliability (*ability of a test to produce similar scores on repeated application*)—results are usually reliable since teacher bias and opinion cannot enter test evaluation. Students are assured of a fair evaluation based on performance.
- b. Speed and uniformity of scoring—since the answers are in a pre-determined simple form, they can be easily and quickly scored. Scoring will be uniform and fair for all students.
- c. Factual information—objective tests are particularly effective in evaluating the extent to which students have learned factual information presented in the course.

2. Objective tests—disadvantages:

- a. Difficulty of construction—development of objective questions is both difficult and time-consuming. The problem of communication and word usage can lead to ambiguous, vague, or misleading questions. Unless care is exercised in the construction of objective tests, students may be placed in the position of knowing the answer to the question but not being able to determine which response is correct.
- b. Depth of evaluation—it is often difficult to ask thought-provoking questions and determine depth of understanding without developing ambiguous questions.

3. Subjective tests—advantages:

- a. Depth of evaluation—thought-provoking questions and questions which require the display of present or potential attitudes represent the major strength of subjective tests. In addition, students can express concepts acquired or developed rather than just factual knowledge.
- b. English mastery—the written essay test permits a student to apply the skills and abilities acquired in his English and grammar classes. In addition, it provides the added opportunity to organize and present difficult concepts of safety education.
- c. Test construction—subjective tests are easy to construct. The teacher must guard against questions which might solicit a variety of responses which cannot be compared for evaluation.

4. Subjective tests—disadvantages:

- a. Reliability—while a high degree of reliability in subjective test evaluation is possible, it will never be as great as for the objective test. Subjective test reliability requires a substantial effort on the part of the teacher. If test evaluation is not conducted carefully,

the test scores can be almost useless in determining student progress.

- b. Time consumption—while subjective tests can be quickly prepared, evaluation is very time-consuming. The time which must be spent in reading and evaluating responses must be considered and budgeted before the test is administered. In addition, student handwriting is often difficult to read and sentence structure poor.
- c. Teacher bias—the teacher must guard against permitting his own prejudices to influence his evaluation of the student's answer.

A quick evaluation of the advantages and disadvantages of subjective vs. objective tests reveals the fact that they complement each other. The weaknesses of one become the strengths of the other. As a result, good evaluation programs will usually combine elements of both. This means that teachers will either combine both types of questions into a single test or, during the semester, use both subjective and objective testing methods. It is important that every effort be taken to make certain that subjective test evaluation is reliable and free of teacher bias, so that it may be used as a contribution to the final evaluation of the student.

#### **PSYCHO-PHYSICAL AND RELATED TESTING PROCEDURES**

The physical abilities of a person are directly related to his ability to avoid accident situations and adjust to the unpredictable. It is obvious that *vision is an important factor in avoiding numerous accident situations*. The ability to notice small objectives which might cause a fall, or low hanging beams or girders which could result in *head injury is directly related to vision*. It is also apparent that a blind person cannot drive safely while a person with excellent vision can, provided other driving abilities are acceptable. At some point between blindness and excellent vision is an area where decreased vision handicaps a person to the point at which successful driving becomes difficult.

Reaction time, distance acuity, night blindness, field of vision, and so on, are all psycho-physical factors which could contribute to a person's ability to avoid accident-causing situations. Or, reversing the concept, the lack of these abilities might serve as contributing factors to accident causation. Their relation to accidents has not, however, been identified. In the area of traffic, where most studies of the relationship of these abilities to accidents have been made, no evidence has been revealed that shows a tendency for the lack of psycho-physical abilities to cause accidents. A

number of intervening factors might explain this apparent lack of correlation.

1. Evaluating devices might be too superficial to identify an existing relationship.
2. A person might learn to compensate for psycho-physical shortcomings. For example, the person with poor distance acuity might leave a greater following distance, pass only when there is more than sufficient distance, and so on. This adjustment would probably be automatic and unknown since most people handicapped in this manner are not totally aware of their shortcomings.
3. Screening devices might already be keeping handicapped people away from accident situations. For example, present driving vision tests already might be denying driver licenses to nearly all people with vision problems sufficiently great to cause accidents.

Despite this apparent lack of correlation, the need to evaluate and determine the extent of these handicaps is an important consideration in safety education, especially in the driver education phase of the program. This understanding will assist individuals in adjusting to personal shortcomings and individual differences in other drivers. It will also emphasize the need for traffic and industrial testing for psycho-physical variables.

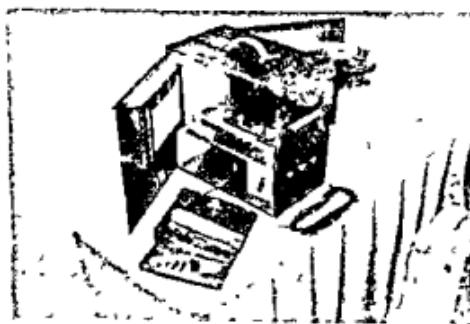


FIGURE 19:1. Portable Psycho-physical Testing Unit. This set of devices can be moved easily within a school district similar to the circulation of other audio-visual teaching materials.  
(Courtesy Porto-Clinic Instruments, Inc., New York)

The psycho-physical tests are conducted with the use of special testing devices. These devices permit the examiner to determine whether or not a person has normal abilities. Figure 19:1 shows a series of different devices which can be used to evaluate vision and reaction characteristics. When an abnormal characteristic is discovered, the teacher should refer

the student to a specialist in that field of physical limitations. This is particularly true of vision difficulties. With proper treatment or corrective lenses, vision can be improved and continued deterioration avoided.

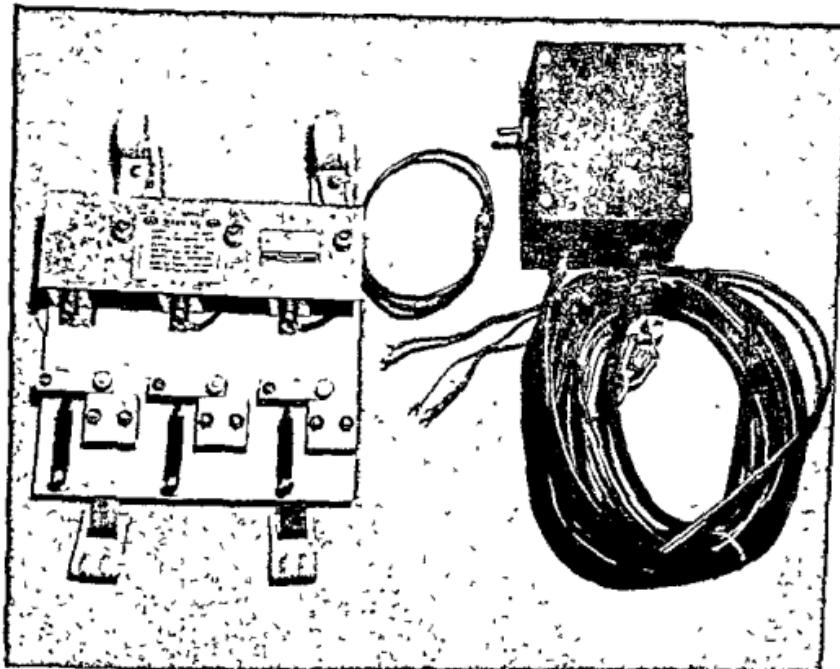


FIGURE 19:2. Automobile Stopping and Reaction Time and Distance Testing Device. The unit on the left is attached to the front bumper of an automobile and fires chalk onto the pavement to record reaction and stopping distance.

(Courtesy American Automobile Association)

A testing procedure related to psycho-physical testing and used almost exclusively in the driver education phase of safety education is the *driving performance testing program*. This program evaluates a person's ability to maneuver an automobile through a maze of driving markers and includes such features as stopping a certain distance from predetermined points, backing along a curving line, and maneuvering through a specially prepared maze. The objective of this evaluation program is to promote safe driving by encouraging people to become as skillful as possible in the control and maneuvering of an automobile. If a person couples a high

degree of skill with a sound attitude toward safe driving, he should be able to drive defensively and avoid accident situations.

#### COURSE EVALUATION

Evaluation in the school program of instruction should not stop when sufficient evidence to assign a course grade has been obtained. Rather, evaluation of teacher competency as well as course organization should be undertaken. This added evaluation will provide information which will assist the professional teacher in improving his teaching methods and adjusting content to provide the greatest learning during the available time. The degree of interest and motivation displayed by the students during the course evaluation will provide the dedicated teacher with further insight into the extent the students have learned to accept safety standards and the improved attitudes which result. The course evaluation may take any of the following forms:

1. Open-ended questions—an opportunity for the student to make general comments and suggestions, either written or oral.
2. Directed replies—where the student answers direct questions or comments on specific phases of the instructional program and/or on the effectiveness of the instruction.
3. Objective questions—where the program and/or teacher are rated. Weak areas can then be studied for possible improvement.
4. Self evaluation—performed by the teacher and based upon observation of class performance, test performance, and general interest and motivation.

**OPEN-ENDED QUESTIONS.** This method of course evaluation involves either a simple form passed out to the class, normally returned anonymously, or a general class discussion. In most cases, the anonymous questionnaire produces more reliable results than the discussion.

In preparing the questionnaire, the teacher should prepare a few leading questions or statements and encourage the class to *write comments which will assist in the future improvement of the class*. For example, the sheet might be headed with a paragraph of the following type:

*"Please provide constructive criticism regarding this course. Specifically, I am interested in finding out from your viewpoint, as a student, which topics were effectively taught and your reasons for regarding them so. Also of interest are those topics you regard as having been ineffectively taught and your suggestions as to how they may be improved. Any additional comments will be welcome."*

This type of paragraph will solicit spontaneous replies from the class. While many class members may turn in virtually blank sheets, the comments which are presented should be of significant value for course improvement.

**DIRECTED REPLIES.** This method is similar to the *open-ended questions* but provides more direction to student answers. It directs student replies to specific areas of the course and forces consideration of the different instructional units. The following sample questions for a safety education course will illustrate this added direction:

1. In your opinion, how well was the unit on home safety presented to the class? Consider such factors as allotted time, teacher presentations, visual aids, student reports, tests, and so on. Explain your answer.
2. In your opinion, do you believe the final examination accurately evaluated the semester's work? What suggestions can you make for improving the examination? Consider such factors as areas covered, length, time limitation, study time required, and so on.

**OBJECTIVE QUESTIONS.** Objective questions regarding course evaluation may take the form of a simple rating scale, multiple-choice questions, or any other objective form of evaluation. Space should always be provided for comments somewhere on the evaluation form to permit spontaneous response from students. The advantage of the objective evaluation stems from the fact that such a rating is normally obtained from all students in the class. The following examples illustrate typical questions which might be used in an objective type evaluation:<sup>2</sup>

1. Plans for the course, as it progressed from week to week, were:
  - a. very well organized.
  - b. evidently organized.
  - c. loosely organized.
  - d. vague and sketchy.
  - e. not evident to students.
  - f. not observed.
2. In dealing with students, the teacher:
  - a. was completely fair at all times.
  - b. was generally impartial and fair.
  - c. was inconsistent.
  - d. tended to be partial.
  - e. showed definite favoritism and personal bias.

<sup>2</sup> Questions excerpted from an opinionnaire developed by Robert Moore, Dean, Division of Sciences and Applied Arts, San Jose State College. (This opinionnaire is the result of integrating questions and ideas from numerous teacher evaluation forms.)

**SELF-EVALUATION.** Self-evaluation of the instructional program, as well as classroom performance by the teacher, should be conducted throughout the semester. The teacher should always be aware of new ideas which might be integrated into the course as well as instructional units he failed to teach adequately. The development of a high degree of awareness of teaching success coupled with the interest in identifying improved teaching procedures will lead to a continual improvement of the instructional program.

**CHARACTERISTICS OF STUDENT EVALUATION.** Whenever students are asked to evaluate and make constructive criticisms, certain pitfalls and difficulties must be faced. These difficulties are not present in other forms of course evaluation, such as curriculum committee evaluation, but must be considered when students are asked to evaluate a course and instructor. The following factors must be considered prior to a student evaluation program:<sup>3</sup>

1. Poor students tend to evaluate their teachers too low while the good students present too high a rating. While this is probably true to some degree, it can be kept under control with thorough instructions to the students. Actually, if this should occur, it would be within itself an indication of poor teacher-student relationships.
2. When students rate a teacher higher than he should be rated, the result is increased ego on the part of the teacher. Again, as in 1., this often happens. However, most teachers should be rated high since they do a good job of teaching. The purpose of the evaluation form should be to isolate the weaknesses, which, it is hoped will be few in number. A few weaknesses become a challenge for improvement to the professional teacher.
3. Teachers can tell the handwriting of the students. When this is a problem it can be avoided by using an objective form and having them collected by a student, placed in an envelope, and left in the office for the teacher to pick up.
4. A poor general evaluation could result in the whole class suffering because of the teacher developing the attitude of, "if they don't like me, why give them good grades?" This can be avoided by having the students elect a member of the class who is directed to collect the forms and transmit them to the teacher (through a school secretary, if necessary) after the final grades for a course have been officially posted.

<sup>3</sup> C. Harold Silvius and Ralph C. Bohn, *Organizing Course Materials for Industrial Education* (Bloomington, Ill.: McKnight and McKnight, 1961), pp. 379-380.

5. Students are not teachers and cannot judge teaching competency. The evaluation form, however, obtains information about what the students think of the course and teacher. It must always be remembered that the course is for the students. If they did not get the instruction they should have received, the teacher either failed to present adequately the aims for the course to students or to provide adequate instruction, or both.
6. Generally, it is impossible for a teacher to communicate and reach every student in each class. The best teachers have students who think they have learned little or nothing from the course. Some evaluation of this type should, therefore, be expected. The master teacher, however, is continually watching for methods of providing optimum instruction for his students in the allotted time.

### **RESEARCH PROGRAMS**

*Research programs in accident prevention and safety education are planned to evaluate existing activities, gather information pertinent to the accident problem, and discover new and better ways of developing an accident-free society. The evaluation of existing activities involves research studies planned to determine the effectiveness of such problems as industrial accident prevention programs, the degree to which a special home-safety program succeeded in informing the public about a community safety problem, and the effectiveness of school driver education programs.*

The most commonly recognized function of research is the gathering of information pertinent to the problem or program being studied. In safety education this activity is best exemplified by the National Safety Council's collection of factual accident information, and its periodic releases to newspapers and public service agencies. This function, however, includes studies to determine the scope of public and industrial accident problems as well as specific data, such as the number of nonswimmers drowning after boats are upset or sunk. It should be noted that some research groups do not accept the collection of factual information as a form of research. In many instances it does not follow research procedures outlined in the following section but merely tabulates information without analysis or conclusions based upon the data. Often, the collection of information is only one part of a research program.

The final function of research in safety and accident prevention, the

discovery of ways to develop an accident-free society, tends to be all-inclusive. It obviously includes the above functions, since information is gathered and programs evaluated in order to develop new and better ways of coping with accidents. In addition, research studies to develop new teaching methods, identify new safety materials, and develop new guards or devices to protect people from machinery and appliances are all examples of research activities planned to develop an accident-free society.

The remainder of this chapter is planned to present the fundamental information about research needed by a professional person in safety and accident prevention. To accomplish this, it is necessary to consider the procedures for conducting research, the application of these procedures to safety and accident prevention, the basic types or classifications of research used by safety personnel and, finally, the application and use of the findings.

### RESEARCH PROCEDURES

Research procedures tend to follow the same format regardless of the type of study being conducted. In the planning of any program of organized research, a study or research design must be developed. *A research design is the formal presentation of the plans for conducting the study.* It must include all planned procedures for gathering and analyzing the data and will include some or all of the following steps:

1. Identification, scope, nature of the problem.
2. Development of hypothesis.
3. Deduction and reasoning, gathering of related information and knowledge.
4. Collection of data—testing, observation, experimentation, and so forth.
5. Analysis of data, generalization in reference to original hypothesis.

By carefully adhering to these steps, a greater degree of validity (*determining the true or real information*) will be possible. By carefully identifying the problem, the research design can be developed to determine whether the hypothesis is true. This procedure of developing a complete design helps eliminate the collection of data in a random fashion (all data must be collected for a use identified in the design), and focuses the research steps on the problem itself.

To guard against error or erroneously verifying a false hypothesis, the hypothesis is often phrased as a null or negative statement. For example,

the problem may be a question regarding the effectiveness of school safety patrols. The hypothesis, worded in the null, would be "*School safety patrols are ineffective in protecting children as they cross streets on the way to school.*" The study design would then be planned to *disprove* the null hypothesis. If the hypothesis, which states "*is ineffective*" is disproven, the question is answered and safety patrols are evaluated as being effective. This procedure is similar to the legal concept of a man being innocent until proven guilty. It is up to the state to establish guilt rather than the accused to prove that he is innocent. Similarly, if the program is *believed effective*, it is up to the researcher to disprove the negative, which would be the concept of any opposing views.

Following the establishment of the hypothesis, the research design must be developed. This procedure includes an analysis of the problem and hypothesis, and a thorough study of all literature and previous research related to the problem. From this analysis, a study design or procedure for conducting the investigation is developed. The implementation of the design includes the collection of the data, whether it be through a survey, interview, observation, or experiment. The data must be arranged in a usable form and statistical procedures applied as necessary.

The most important part of any research design is the analysis and interpretation of the information gathered. Even though the research findings are often definitive, the use and analysis requires careful consideration to make certain that they are both within the bounds of the data and as extensive as the findings will permit. Considerations for design modifications, the occurrence of the unexpected, and the need for related studies to further amplify the knowledge of the area should be considered during this final phase of the study.

#### BEHAVIORAL AND PHYSICAL SCIENCES

Research in safety and accident prevention may be classified into two categories. When considering the problems related to the behavior of humans as they engage in their daily activities, research involves the disciplines and limitations of the behavioral sciences. At the same time, when mechanical devices or materials are being studied as they relate to creating a safe environment, the limitations of research in the physical sciences must be applied. As with most related activities, it is not possible to make a clear and absolute differentiation. Many studies involve aspects of both classes of research in varying degrees. The determination of the safest

design for an electric toaster must involve a consideration of the ways in which a toaster may be misused (prying bread with a fork), as well as the more materialistic aspects of its mechanical safety.

Research in safety as related to the behavioral sciences offers a great challenge to professional safety and accident prevention personnel. The complex problems of predicting and modifying human behavior are continually involved in this area of research. Compared with the physical sciences, research procedures now used are more recent. Basic research tools of the behavioral sciences, such as the use of tests of significance through the *t-test*, *chi square*, and *analysis of variance* are relatively new when compared with the physical science procedures developed and used by the early Egyptians. Because of this factor and the added difficulty of conducting controlled experiments on human beings, knowledge about the control of human behavior is far *behind* the knowledge people possess about the physical world. These reasons partly explain why a large segment of the recorded improvement in accident statistics can be attributed to programs based on research in the physical sciences. At the same time, the greatest hope for future improvement lies with the development of improved accident prevention programs and the development of a society which accepts a realistic approach to the accident prevention problem of this age.

### RESEARCH IN HUMAN BEHAVIOR

It is possible to classify safety and accident prevention research related to human behavior into three general classifications: normative, historical and philosophical, and experimental. By studying each of these classifications, a fundamental understanding of the role of research in safety and driver education will be developed.

#### NORMATIVE

This form of research investigates the present norms, status, conditions, or beliefs. In safety, it is represented by investigations of the following types:

1. Facts and statistics--the scope and nature of the accident problem is determined by a continual analysis of the type, nature, number, and distribution of accidents. The continual study of factual information regarding all aspects of property damage, accidental injury, and death

provides insight into the extent and nature of the problem and also the effect of safety education, safety programs, and product and material improvements. The basic methods for gathering this type of information involve the analysis of reports, surveys, and questionnaires.

Opinions and beliefs—the opinions and beliefs of safety experts and the general public are of considerable importance to the safety movement. Polls investigating opinions and beliefs can provide information related to teaching methods, programs, evaluation techniques, and current trends.

Observation—the observation of safety programs, safety classes, and the general public as they work, travel, and play can provide information related to the effectiveness of present programs and modifications of future ones.

Analysis of literature and written materials—the study of current literature can reveal information related to current trends and opinions. Much of the factual information related to numbers of deaths and injuries comes from a continual study of death certificates and medical reports.

Ex post facto evaluation—*an analysis of conditions resulting after the fact or after the conditions happened in a natural form without experimental control.* For example, the effectiveness of driver education in reducing accidents can be determined by studying the driving records of students during the years following completion of the course. In conducting this form of research, the evaluator would select a group of students who completed driver education five years ago compared with a group of the same age (and other related factors) who did not take the course, and study their accident and violation records. This study could be completed as fast as the records could be analyzed. The principle drawback of this type of research is the lack of experimental control.

#### HISTORICAL AND PHILOSOPHICAL

The study of historical information and the analysis of the past in terms of the present and future can make a valuable contribution to the solution of safety problems. It is often possible to find solutions to current problems by studying similar past problems and their solutions. Often, historical information is part of an experimental or normative study and helps identify areas and contributes to the establishment of sound

hypotheses. This form of research contributes to the orderly presentation of knowledge and helps prevent planning designs without consideration of studies covering similar or identical problems.

Philosophical research is grouped with historical because they are usually linked together. In philosophical research, the past is studied and evaluated in terms of its contribution to the present and future. Analytical analysis as well as the logical evaluation of possible solutions to problems is an important phase of philosophical studies.

Historical and philosophical studies should not be substituted for experimental or normative research. When these forms of research can provide a more analytical approach and solution to the problem, they should be utilized.

#### EXPERIMENTAL

Experimental research has the promise of exercising considerable influence on safety and accident prevention programs of the future. Many of the problems which have remained unanswered or only partially answered will be resolved through research designs based on experimental research.

This form of research involves the use of controlled conditions and an analysis of the resultant data, based on probability. That is, the experimenter places controls on a group, lets only one item vary, and then analyzes the way in which the one uncontrolled condition varied. For example, a community safety group wishes to discover which of two methods of presenting information on "do-it-yourself" safety will produce the best results. The two methods under study are the small group lecture versus the small group discussion. In order to assure reliable and valid results, every effort is made to establish experimental conditions which will permit the comparison of the methods of instruction.

A single group of people is selected from a consistent socio-economic status. The group is divided into two equal-size groups either randomly, or by matching people based on factors which might affect the results (such as previous accident records), and then assigning one of the matched pair to each group. One group is taught safety by the lecture, the other by group discussion. Time spent on both programs is kept the same. After the instruction, the two groups are watched for a specified period of time and the number of "do-it-yourself" home accidents recorded. If all other factors, except instruction, have been held constant, differences be-

tween the two groups must be either *chance* or *difference of instructional method*. Statistical procedures will provide the study group with a mathematical evaluation which describes the extent of the possibility that chance might have caused the difference in results—rather than the different methods of instruction.

There are many examples which could describe different types of experimental research. The important characteristics that identify this form of research are the selection of small groups to represent the large number of people under study, the control of conditions, and the analysis of results to determine the probability factor. This form of research can provide definite information regarding the behavior of people under different circumstances and controls.

#### RELIABILITY AND VALIDITY

Reliability and validity are two concepts which are important in all forms of research, as well as all forms of classroom and program evaluation. They have, however, particular importance for research.

*When research findings are described as being reliable, repetition of the study would result in similar results. Similarly, a reliable test is one in which scores would be nearly identical if the test were repeated for the same group—provided additional learning had not taken place.* Reliability is important to a research study. Without it, the results would be useless since there is no assurance that the results are true evaluations and not just chance occurrences.

*Validity is the characteristic of a study or program of evaluation to accomplish what it originally planned. An attitude scale is valid only if it correctly evaluates the attitudes of people being tested. Research findings are valid when they accurately and correctly show the results originally sought.* For example, a research design planned to discover the "extent which consumption of alcohol causes drowning" is valid only if the relationship discovered is the correct one. In the case of alcohol and drowning, the study may show a positive cause-and-effect relationship. That is, "people under the influence of alcohol are more susceptible to drowning than people who have not been drinking."<sup>4</sup> This study would be invalid if future research showed that "a reckless or immature pattern of

<sup>4</sup> While this initial relationship between drinking and drowning is correct and is described in an earlier chapter, the remainder of this example is hypothetical, and presented to illustrate the concept of validity.

behavior caused people to drink and also caused them to ignore water safety practices." This discovery would mean that drinking is not primary but intervening in the cause-effect relationship between personality and drowning.

#### STATUS OF RESEARCH

Research in the behavioral science phases of safety and accident prevention has been extensive but insufficient to solve many of the problems facing the profession. The areas of safety programming and formal education are in need of research to investigate content selection, teaching methods, and evaluative techniques.

Normative research has been extensive and well-conducted in the area of accident statistics. The National Safety Council has developed extensive and accurate methods of collecting data and distributing information related to the scope and nature of the accident problem to interested people.

However, research in the area of program planning, teaching methods, and evaluation has been left, almost exclusively, to graduate students in programs of higher education. While master's theses and doctoral dissertations are able to contribute to the professional literature, they are often first efforts at research and lack the insights and depth necessary for significant solutions of problems facing formal safety education programs.

The area of psycho-physical attributes related to safety has been extensively investigated, especially in the areas of industrial and traffic accidents. Controlled experiments have been extensively used in these areas. The result has been greater insight into the problem of physical limitations and the development of protective devices to guard against possible injury. Many aspects of research in these areas could be considered in the following section on the physical sciences.

The final area under consideration is driver education. Many state agencies and other interested groups have attempted to determine the extent driver education has helped solve the traffic accident problem. The Lane-Reticker study, conducted in North Carolina, analyzes many of these efforts.<sup>5</sup> His analysis reveals that virtually all studies have been conducted on an ex post facto rather than experimental basis. While the sum total of all studies indicates that the program has been effective, no study has been conducted on an experimental basis with sufficient control

<sup>5</sup> Edward Lane-Reticker, *Driver Education in High Schools*, mim. (Chapel Hill, N.C.; Univ. of North Carolina) 1956.

to determine an accurate evaluation of the degree of success. Additional research is needed in this area to determine the exact degree of effectiveness of this program in solving the traffic accident problem.

### RESEARCH IN PHYSICAL SCIENCES

Research in this area involves the prevention of accidents by controlling the physical world or developing devices which will help eliminate the possibility for the occurrence of accidents. These areas can be subjected to experimental types of research with greater ease than research in the behavioral sciences. It is easier to establish controls and hold variables constant when working with materials such as safety-belt webbing and mechanical guards, than working with the fluctuating characteristics of humans.

Many phases of research in this area combine problems of materials with human behavior. Research in the areas of seat belts, for example, involves both the effectiveness of seat belts in reducing accidents and the use of seat belts under normal driving conditions. Early studies concentrated completely on the material and medical aspects of seat belts and showed that they were effective in reducing deaths and injuries from accidents. They did not, however, consider the problem of encouraging people to use the seat belts at all times. The result was many installations but considerable apathy regarding their use.

Research in the physical sciences has been extensive and well conducted. Methods of testing and selecting materials have produced roads with high coefficients of friction, guards that permit safe use of potentially dangerous equipment, and appliances that protect children from injury even though misused. Even though research in this area has been extensive, additional research is continually needed to keep abreast of the advances being made by society.

### USE OF RESEARCH FINDINGS

The results of research programs are often carefully prepared and published, and then ignored or given limited use. This is not the case when research is performed to solve a particular problem, such as the determination of the strongest building material to support a particular structure. However, if the objectives of research are to be achieved, broad application of the findings must be made by professional persons in the field.

Teachers and safety personnel should be aware of the research which

has been completed and the methods of putting it to use in their safety programs. A study analyzing different methods of teaching safety is of no value unless safety people put it into use. In addition, many studies provide new information which should be presented to the class as safety content. If the teacher does not keep abreast of recent developments by reading the safety journals and taking an active part in his professional organizations, his instruction program will lack the current examples and information which often represent the difference between mediocrity and excellence.

There are a number of excellent sources for reviewing the published results of research studies in this area. They include:

1. *Traffic Safety Research Review*. This is a quarterly supplement published by the editors of *Traffic Safety*, a journal of the National Safety Council. The review carries research reports of studies in the area of traffic safety, covering both the behavioral and physical science aspects.
2. *National Commission on Safety Education and The American Driver and Traffic Safety Education Association*. These affiliates of the National Education Association have the major responsibilities of that organization for the publication and dissemination of professional safety literature. Their journals and publications often contain reports of research studies.
3. *The Bridge*. This is a series of information leaflets based on research in, or related to, safety education. They are published by the National Commission on Safety Education.
4. *Safety Education*. This monthly publication of the National Safety Council periodically contains a research section titled "News of Research," which provides valuable information on research studies completed or in progress.

## SUMMARY

Evaluation of accident prevention and safety programs is an important part of the continual growth of the safety movement. Accurate evaluation will indicate the degree of success in reducing or eliminating a particular safety problem. It will also provide the information necessary for reorganization and development of improved programs.

Unfortunately, evaluation of attitude change and development is difficult under any circumstances and virtually impossible within the limitations of time and numbers existing in public schools. As a result, the

success of attitude modification or development must be based on an evaluation of instruction planned to promote this change. This involves a subjective evaluation of the teaching methods as well as objective considerations of the subject matter content. Careful interpretation of these results will provide insights into the extent socially acceptable attitudes have been developed.

Research is an important part of the over-all safety effort, since it has the continual responsibility of discovering new information and new ways of presenting safety information and eliminating accident situations. In areas in which safe practices can show an immediate financial return, considerable research has been accomplished. Industrial and traffic safety have well-developed programs of research involving the investigation of materials and procedures to safeguard individuals and develop devices which reduce the possibility of human error. In areas of human behavior, such as school, home, and recreation, research has not been given the same financial support and is not, as a result, as well developed or as productive.

The use of research findings, especially in disseminating new information to the public, is a problem of continual concern. Every effort must be made to provide safety personnel with the latest information so that school and public information programs can provide current and pertinent information. In the final analysis, teachers must continually review and apply research findings for the improvement of their instructional program. If this is done, the expense and efforts of people engaged in research activities will be justified.

## ACTIVITIES

1. Plan a program of evaluation to identify the effectiveness of teaching and course organization. Include a student questionnaire and plans for the continuous evaluation of instruction throughout the semester.
2. Review one complete research study from the library. Present a report to the class, including the statement of the problem, method of investigation, findings, and conclusions.
3. Select one research study from the library. Prepare a report on how the findings may be utilized in the elementary or high school program of safety education.
4. Prepare a written test, using both objective and subjective questions, to evaluate one phase of a high school safety education course.
5. Plan a panel discussion to analyze the following question: "How can

a teacher identify progress in the development or modification of safety attitudes?"

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# Career Opportunities and the Future

THERE ARE MORE than one million persons employed in positions that are completely or partially concerned with safety. Without question, the field of safety education and accident prevention offers the student of today opportunities for professional vocations that are among the most challenging in the United States. It seems that career positions related to education, traffic engineering, law enforcement, motor fleets, traffic courts, research, and many others are available to those with the proper education. The purpose of this chapter is to identify the various career possibilities available to the college and university student of today.

## NEED FOR PROFESSIONAL PERSONNEL

There is a need for professionally prepared individuals in the field of safety education and accident prevention. In the past, inadequately prepared people have tended to drift into the field. This situation in recent years has been undergoing drastic change, and today professionally competent persons are occupying positions of responsibility in safety education, traffic engineering, and law enforcement across the nation.

In view of the anticipated growth of the general population, there will be a serious need for a greater number of professional safety educators and accident prevention specialists. Accidents will continue to occur at home, on the job, in public places, at school, and on the highways. Therefore, individuals dedicated to the prevention and elimination of such occurrences will be in greater demand. A substantial amount of the discussion in this chapter is based on the publication, *Careers in Highway Safety*.<sup>1</sup>

<sup>1</sup> National Commission on Safety Education, *Careers in Highway Safety* (Washington: The Commission, 1958).

## TYPES OF CAREERS

Career opportunities in accident prevention work available to the interested young person include teaching, agency positions, official capacities, military opportunities, motor fleet supervision, and industrial safety engineer positions.

## EDUCATION

The field of education offers one of the most fertile opportunities to individuals interested in safety and accident prevention. There are positions at every level of education that require professional preparation in this area. In addition, there are about one million elementary and secondary school teachers who teach safety, but not as a full-time job. Certainly some knowledge of safety is necessary for these teachers in order to build in their pupils the necessary attitudes, habits, and knowledge vital to safe living. Three states require their teachers to complete a course in "Fundamentals of Safety Education" to qualify for certification. Other states have legislation requiring colleges and universities to offer a safety course for education majors.

**DRIVER EDUCATION.** Driver education teachers have been in great demand in recent years. As states continue to upgrade the teacher preparation requirements, the demand for highly qualified driver educators will continue to grow. The current analysis of the National High School Driver Education Achievement Program reveals that there are approximately 20,000 driver education teachers.<sup>2</sup> The minimum preparation recommended for such positions is a minor in driver and safety education. However, this is a minimum certification standard and, as the field continues to mature academic preparation comparable to that required in other teaching subjects also will be required of the driver education teacher.

**SAFETY SUPERVISORS.** Across the nation, school systems are assigning individuals the responsibility of supervising the total safety program of schools. The growth of the Safety Supervisors Section of the National Safety Council from a membership of 45 persons to over 700 is evidence that numerous supervisory positions are being created every year. These

<sup>2</sup> Insurance Institute for Highway Safety, *National High School Driver Education Award Program* (Washington: The Institute, 1962).

persons need to have a high degree of preparation and experience in safety and accident prevention work to qualify for such positions. The responsibilities of the safety supervisor would be concerned with co-ordinating the general safety in the elementary and secondary schools, overseeing the driver education program, and supervising the pupil transportation activities. The percentage of time a safety supervisor may devote to safety is dependent on the school's size. However, it is recommended that every school system have a supervisor of safety education.

UNIVERSITY OR COLLEGE. Institutions of higher learning are more and more in need of competent individuals to fill places of responsibility and leadership related to safety education and accident prevention activities. There is a need for persons to enter the teacher preparation field. Outstanding college and university teachers are needed for the preparation of driver education teachers, safety supervisors, and elementary and secondary school personnel. There are nearly 400 colleges and universities offering teacher preparation courses in these areas today. With the development of safety centers across the nation, highly qualified persons are in demand to occupy positions related to the conduct of safety research, field service activities, short courses and conference work. Moreover, institutions of higher learning are employing campus safety co-ordinators to assume responsibility for the environmental safety program of the institution.

#### AGENCY POSITIONS

There are a number of agencies that employ individuals to work as safety education and accident prevention specialists. These positions are frequently referred to as field representative, safety consultant, or educational consultant. Organizations employing such personnel are the National Safety Council, National Commission on Safety Education, local safety councils, insurance companies, automobile manufacturers, and other agencies with national or state accident-prevention program activities. There is every indication that these numerous agencies will continue to expand their activities and will experience a similar growth in staffs. For additional information on the agencies employing traffic safety education and accident prevention personnel, consult the *Directory of National Traffic Safety Organizations*, available from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Illinois.

### OFFICIAL AGENCIES

The administration of a statewide program of accident prevention requires the skill and knowledge of many different professional persons. For example, in a motor vehicle department there is need for license examiners and supervisors, hearing officers, statisticians, and driver improvement personnel. In a traffic safety division there is need for traffic safety program specialists, enforcement and traffic court consultants. In the highway departments there is need for traffic engineers, engineering technicians, and highway engineers. There are over 35,000 highway engineers today, based on estimates of the Highway Research Board. The state police units need high-caliber men to work in various enforcement capacities. In addition to state agencies, there are agencies at the national level that employ accident prevention and safety education staff. The Bureau of Public Roads and the Department of Highway Safety, for example, have need for more professional personnel as important programs are developed in the area of traffic safety.

### MOTOR FLEET

The motor fleet industry has been one of the pioneers in the organization of traffic safety programs. The vast extent of the nation's commercial fleet operation requires accident prevention personnel of various kinds, for example, safety supervisors, driver trainers, field supervisors, and vehicle maintenance specialists. The American Trucking Association estimates that today there are over 30,000 persons employed in this area.<sup>3</sup> With the anticipated growth of the nation's economy, the motor fleet industry will continue to expand its operation. This expansion will require a parallel growth in the number of persons employed to work with driver education and accident prevention programming.

### INDUSTRY

Traditionally, American industry has been the leader in the nation's accident prevention movement. Therefore, it would be but a normal procedure for industry to employ numerous industrial safety specialists. The American Society of Safety Engineers has a membership in excess of 7,500.

<sup>3</sup> *Ibid.*, p. 37.

therefore intimating that industry does employ qualified people in the field of accident prevention. An industrial safety specialist needs to have a background including engineering principles, management techniques, human relations, and public relations. Today, in the midst of this nuclear age, accident prevention personnel are sorely needed in those industries related to the space effort. It should be recognized that the success of the nation's space probes has been in large measure due to the application of accident prevention doctrine and methods.

#### MILITARY

The nation's largest employer of safety education and accident prevention personnel is the Defense Department. In the Departments of Army, Navy, Air Force, and the Marine Corps there is continuous need for individuals to organize, teach, or supervise accident prevention activities. In most instances, the various departments have developed civilian career programs that allow interested persons to work in this field and maintain their status as civilians. For example, the Department of Army has developed an outstanding Army Civilian Career Program for Safety Management. In the armed forces, a person may pursue programs of safety administration, engineering, or inspection. These programs are highly specialized and require a person with a background heavily oriented in engineering, chemistry, physics, or mathematics.

#### SOURCES OF CAREER INFORMATION

On previous pages the many opportunities available in the field of safety education and accident prevention have been discussed briefly. In addition to the information given, it is well for the interested person to have some idea as to where additional information related to career pursuits might be obtained. Your instructor should be able to assist you in this matter. However, the following list of sources will prove valuable to those desiring information about career possibilities:

1. American Association of Motor Vehicle Administrators.  
504 Hill Building, Washington 6, D.C.
2. American Driver and Traffic Safety Education Association.  
1201 16th St. N.W., Washington 6, D.C.
3. American Society of Safety Engineers.  
5 North Wabash Ave., Chicago 2, Illinois.

4. Center for Safety Education, New York University.  
6 Washington Sq. N., New York 3, New York.
5. Institute of Traffic Engineers.  
2029 K St. N.W., Washington 6, D.C.
6. National Commission on Safety Education.  
1201 16th St. N.W., Washington 6, D.C.
7. National Safety Council.  
425 N. Michigan Ave., Chicago 11, Illinois.
8. Public Safety Institute, The Pennsylvania State University.  
University Park, Pennsylvania.
9. Safety Center, Southern Illinois University.  
Carbondale, Illinois.
10. Traffic Institute, Northwestern University.  
1804 Hinman Ave., Evanston, Illinois.

### THE FUTURE

The futures of the United States and other nations lie in their ability to conserve human resources. Prior to the present century, the almost total absence of accident prevention measures suggested that very little value was placed on the life or well-being of the individual. However, by 1900 it was recognized by industry and governmental agencies that the strength of any nation rests in its people. This country has realized for better than half a century that its people are its most valuable resources. Safety education and accident prevention programs have assisted substantially in the saving of thousands of lives during this period of time. The further development of effective programs of safety education and accident prevention will aid in assuring a fruitful and constructive future.

The estimated population of the United States for 1975 is 222 million. This means that the nation's population is growing at a rate of about three million per year. Along with the population growth, there will be a continued expansion of the nation's economy. The question is: What will be the accident trends that parallel this period of growth and prosperity?

### ACCIDENT TRENDS

During the first 50 years that the automobile was on the American scene, one million lives were lost due to its misuse. It is estimated that the second million lives will be lost in less than half the time it took to lose

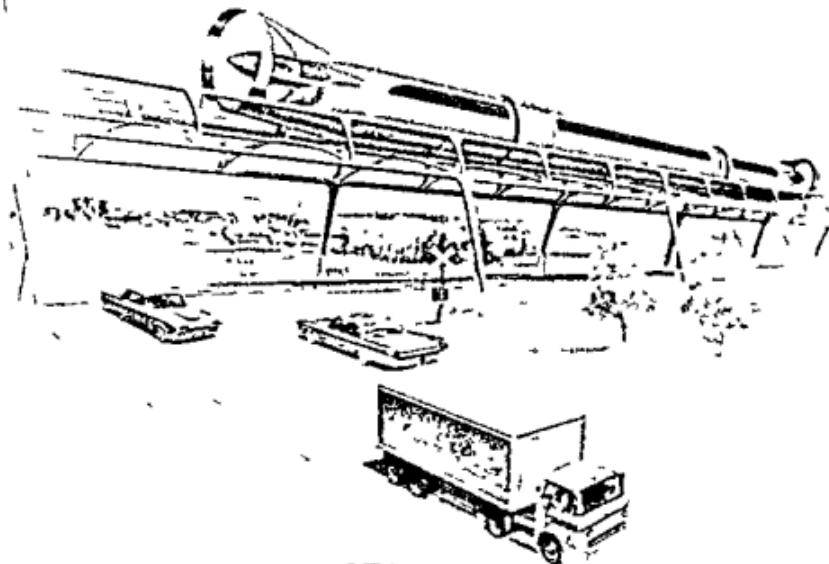


FIGURE 20.1. The Levatrain — a designer's concept of passenger transportation in the future.

(Courtesy Ford Motor Company)

the first. By 1975 it is projected that there will be approximately 51,000 traffic deaths each year as compared with 40,000 today; there will be around 110 million vehicles registered; these vehicles will be driven some 1,171 billion miles by about 111 million licensed drivers. This example does not lend itself to optimistic thinking concerning the traffic problem of the future.

Traffic has been used as the example, but the same situation seems to apply to most areas of human activity. Accidents will persist unless comprehensive and dynamic programs of safety education and accident prevention are developed to curb the trends of the sixties. If accident prevention programming is continued at the same rate as today, the general accident problem will continue to grow. If accident prevention programming keeps abreast of the expanding population, then we will hold our own. If we are to progress and gain on the nation's accident problem, all accident prevention efforts must be intensified and expanded substantially.

Because of the scientific age in which we are living, the above observations seem more than justified. Safety education and accident prevention programming are necessary components of any scientific endeavor. It would be futile to educate scientists and then have them killed in accidents because they lacked safety knowledge or did not apply that knowledge. The space age, modern industry, and the future of America are all dependent on the conservation of human resources. Therefore, they are also dependent on safety education and accident prevention programs.

#### RESEARCH

In all probability the current knowledge of accident prevention techniques and methods is inadequate to safeguard the citizenry of tomorrow. In view of this assumption, research in programming, methods, and techniques must be intensified in order to develop new accident prevention techniques and methods. Research in the nature and scope of modern hazards will also be vital to the conservation of the nation's manpower.

#### EDUCATION PROGRAMS

The challenge of safety education will be greater in the future than ever in the past. The best way of hoping to curtail and control the nation's accident problem is to provide adequate safety instruction for young and old alike. Giving safety instruction to students enrolled in our schools and colleges will be the responsibility of the schools, and should include all phases of general safety.

Education of the adult population will also require a massive program of safety education. Education for safe living is as vital to the preservation of the older generations as it is to guard the younger. Schools and communities should enter into this program as a co-operative venture. This would give the program status and community interest that would assure support and success for the endeavor. Adult safety education activities will help provide for the public safety in the future and set the stage for the younger generations.

#### SUMMARY

Today many career opportunities in safety are available to the interested college or university student. Jobs are available for teachers on the

college, university, or secondary levels. In addition higher education has administrative and research positions available. Many career pursuits abound in industry, official state agencies, and the military. It appears that as programs related to the curtailing of the nation's accident problems are developed and expanded, numerous career positions will open to the individual who is professionally prepared to assume such responsibility. The future of our space age, industrial, and social science efforts in large measure are related to the development of sound programs of safety education and accident prevention. Indeed, progress, efficiency, and safety are very intimately interwoven. The conservation of our human resources is very closely attuned to the accident prevention movement of tomorrow. If man is to be saved from the accident potentials that surround him, then he must be subjected to a comprehensive and continuous program of safety education and accident prevention.

## ACTIVITIES

1. Contact your university placement service to discover the types of safety education positions that have been filled during the past three years.
2. Prepare a 20-minute report based on the publication, *Careers in Highway Traffic Safety*.
3. Contact a local industry and interview the person in charge of its safety program. Write a report of the interview including job qualifications, scope of the program, and career possibilities.
4. Collect sufficient data on estimated population, economic, and industrial growth along with the new interstate highway development, and write a research paper on "The Future of Safety Education in the Decade Ahead."

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National Safety Council, *Safety in the 60's*, Chicago: The Council, 1959.

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# APPENDIX

## Sources of Safety Education Materials\*

**Aetna Life Insurance Company**  
151 Farmington  
Hartford, Connecticut

**Allstate Insurance Company**  
7447 Skokie Blvd.  
Skokie, Illinois

**American Association of Motor Vehicle  
Administrators**  
504 Hill Building  
Washington 6, D.C.

**American Association of State Highway  
Officials**  
National Press Building  
Washington 4, D.C.

**American Automobile Association**  
1712 G Street  
Washington 6, D.C.

**American Bar Association**  
1155 E. 60th Street  
Chicago 37, Illinois

**American Camping Association, Inc.**  
Martinsville, Indiana

**American Driver and Traffic Safety  
Education Association**  
1201 16th Street, N.W.  
Washington 6, D.C.

**American National Red Cross**  
18th and E Streets, N.W.  
Washington 13, D.C.

**American Transit Association**  
292 Madison Avenue  
New York 17, New York

**American Trucking Association**  
1424 16th Street, N.W.  
Washington 6, D.C.

**Association of Casualty and Surety  
Companies**  
60 John Street  
New York 7, New York

**Auto Industries Highway Safety  
Committee**  
2000 K Street, N.W.  
Washington 6, D.C.

**Automotive Safety Foundation**  
200 Ring Building  
Washington 6, D.C.

**Center for Safety Education**  
New York University  
6 Washington Square, N.  
New York 3, New York

\* In addition to these sources, many colleges and universities have developed safety education materials of particular interest in their state or region.

Eno Foundation for Highway Traffic Control  
Saugatuck, Connecticut

General Federation of Women's Clubs  
1734 N Street, N.W.  
Washington 6, D.C.

Highway Research Board  
2101 Constitution  
Washington 25, D.C.

Highway Traffic Safety Center  
Michigan State University  
D-Wells Hall  
Lansing, Michigan

Institute of Traffic Engineers  
Yale University  
Strathcona Hall  
New Haven 11, Connecticut

Insurance Institute for Highway Safety  
1725 De Sales, N.W.  
Washington 6, D.C.

International Association of Chiefs of Police  
1319 18th Street, N.W.  
Washington 6, D.C.

Interstate Commerce Commission  
Bureau of Motor Carriers  
Safety Section  
Washington, D.C.

National Association of Automotive Mutual Insurance Companies  
919 N. Michigan Avenue  
Chicago 11, Illinois

National Association of Insurance Agents  
80 Maiden Lane  
New York City, N.Y.

National Association of Motor Bus Operators  
Hill Building  
Washington 6, D.C.

National Association of Mutual Casualty Companies  
919 North Michigan Avenue  
Chicago 11, Illinois

National Commission on Safety Education  
1201 16th Street, N.W.  
Washington 6, D.C.

National Committee on Traffic Law Enforcement  
744 Broad Street  
Newark, New Jersey

National Committee for Traffic Safety  
20 North Wacker Drive, Room 960  
Chicago 6, Illinois

National Committee for Traffic Training  
700 Hill Building  
Washington 6, D.C.

National Congress of Parents and Teachers  
700 N. Rush Street  
Chicago 11, Illinois

National Federation of Business and Professional Women's Clubs  
1819 Broadway  
New York 23, New York

National Fire Prevention Association  
60 Batterymarch Street  
Boston, Massachusetts

National Highway Users Conference  
National Press Building  
Washington 4, D.C.

National Rifle Association  
1600 Rhode Island Avenue, N.W.  
Washington 6, D.C.

National Safety Council  
425 N. Michigan Avenue  
Chicago 11, Illinois

Nationwide Insurance  
246 High Street  
Columbus, Ohio

Northwestern University Traffic Institute  
1804 Hinman Avenue  
Evanston, Illinois

Outboard Boating Club of America  
307 N. Michigan Avenue  
Chicago 1, Illinois

President's Committee for Traffic Safety  
1711 H Street, N.W.  
Washington, D.C. 20025

Safe Winter Driving League  
520 N. Michigan Avenue  
Chicago 11, Illinois

## Appendix

State and Local Officials' National  
Highway Safety Committee  
912 Barr Building  
Washington 6, D.C.

United States Junior Chamber of  
Commerce  
Akdar Building  
Tulsa, Oklahoma

U.S. Bureau of Public Roads  
Office of Highway Safety  
Washington 25, D.C.

U.S. Coast Guard Auxiliary  
1300 E. Street N.W.  
Washington 25, D.C.

U.S. Power Squadron  
P.O. Box 510  
Englewood, New Jersey

Yale University  
Bureau of Highway Traffic Safety  
311 Strathcona Hall  
New Haven 11, Connecticut

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